DEGER ENERGIE
SOLAR TRACKING SYSTEMS

Assembly Instruction

US Version

DEGER**traker** 5000HD
DEGER**traker** 6000NT

Effective 2010-11-01

Assembly Instruction DEGERtraker

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IMPORTANT INSTRUCTIONS!!
Please pay attention to the instructions on Page I-1 and 2!

Assembly Instruction DEGERtraker

Part I - Basics
Inroduction

Congratulation for aquiring a DEGERtraker.
You decided on a high quality dual-axis solar tracking system which is suitable for all current photovoltaic solar modules.

Maximum solar yield:

The maximum solar yield can be achieved with the DEGERtraker tracking system.
By using the DEGERtraker tracking system, you are truly acknowledging the power of nature: you are not only protecting our environment and nature but you are increasing your yield and thus achieving ROI sooner.
During the day, the DEGERtraker aligns itself like a sunflower following the sun or the brightest source of light.

Maintenance-free. Long-life. Recyclable.

The systems designed to these exacting parameters are mass-produced in an ISO 9001-certified factory under environmentally sound conditions. DEGERtraker systems are truly 99.9% recyclable.
Compared with rigid systems, the amount of electronic scrap after useful life is 40% lower!

Quick installation.

Pre-assembled components with detailed instructions allow an installation within less than four hours (after the mast has been erected).

A technology to rely on.

The fact that the patent-protected control system and the utility model-protected mechanical system were awarded the inventor's prize of the federal state of Baden-Württemberg in South-Germany in 2000 shows that the DEGERtraker meets the demands of both experts and investors.
Since this award the control unit and the mechanical system have been improved continuously. The design of the DEGERtrakers is done according to ASCE-7 with independent certification.

Scope of delivery.

Complete dual-axis tracking system: mast, rotating head, supporting frame, aluminium solar module carrier system - to fit the respective module type.
Control electronics: DEGERconecter with energy converter for extremely economical operation, wind monitor and optional sunlight sensor and security sensor.
Foundation plan and this assembly instructions.

IMPORTANT INSTRUCTIONS!!

The installation of the DEGERtraker may only be conducted by suitable specialists!
We recommend that the system be inspected by a master electrician, or at least a person with equivalent qualification, after completion.
The start-up protocol (page VI-4) is to be used for this and should be filled out on initial operation and faxed to the company DEGERenergie within 4 weeks of start-up. The entitlement to warranty claims for material defects will be only extended from the two-year period warranty to 5 years if this protocol is submitted within the specified timeframe.

A fault report (page VII-4) must be submitted in order to process complaints. Complaints cannot be processed if fault reports have not been filled out correctly!! (the serial number of the defect system must be included in the report)

SAVE THESE INSTRUCTIONS!

Assembly Instruction DEGERtraker

Part I - Basics
Security advices

1. Before assemblage of the DEGERtraker read all instructions.

2. Save these instructions!

3. The installed DEGERtraker tracking system has to be protected against trespassing in its whole sphere of action by adapted measures, for example by erecting a fence.

4. While assemblage of the DEGERtraker or parts of the system and while the system is put into operation some risks of injury exist caused by moveable parts of the tracking system. To protect injuries caused by possibly existing burrs or sharp angles we imperatively recommend to wear gloves when mounting the steel parts of the system.

5. In case of checks or changes at the DEGERtraker all parts of the system have to be free of potential. Zero-potential and mechanical protection have to be proven and guaranteed due to the “Allgemeinen Regeln zur Unfallverhütung”. When voltage supply is indispensable for checking the system injuries of persons have to be ruled out by adapted actions.

6. Lightning protection and earthing have to be achieved due to state specific requirements as with all photovoltaic systems.

7. The whole sphere of action has to be free of any objects.

8. Elevation-axle and azimuth-axle of the DEGERtraker can be moved manually by the enclosed Central Control Box (CCB). Therefore please pay attention to part V of this assembly instruction.
To move the traker safely in the horizontal position in case of power failure we recommend to use a uninterruptible power supply. When all electrical components fail the systems can be moved into the horizontal position by using standard tools. (see III-6)

9. The development of the DEGERtrakers is based on the ASCE-7. Reducing the module surface the system will be able to resist higher demands than the values given in the norm. The maximum mountable module surface depends on regional conditions and regulations. To calculate the maximum mountable module surface a dimensioning-tool is available on our website. The download of the dimensioning-tool is free.

10. DEGERtrakers can also be set up in earthquake endangered zones without reservation in respect of module area or foundations geometry.

11. In case of accumulation of snow on the module surface with more than 35kg/m² it is necessary to broach the module surface. It is possible to do this by activating manually the CCB as described above.

12. Intended Use
A DEGERtraker is designed and dimensioned to be applied with standard-photovoltaic modules and is therefore not adapted to be applied with concentrator modules, mirrors, solar thermal collectors etc. The maximum mountable module surface calculated by the dimensioning-tool must not be exceeded in any case. As soon as the modules are mounted an operating windguard has to be assembled or the module surface has to stay in the horizontal position.

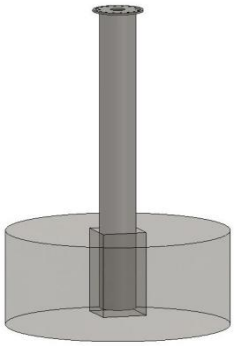
Permissible ambient temperature:	-4°F to +131°F	
Sound level:	Distance 33 ft:	40 dB(A)
	Distance 66 ft:	no difference to the sound level of the surrounding measurable
	Reference value:	
	40 dB(A) corresponds to:	- tweet of a bird - usual background sound level in a house

Assembly Instruction
DEGERtraker

Part I - Basics
Short assembly instruction

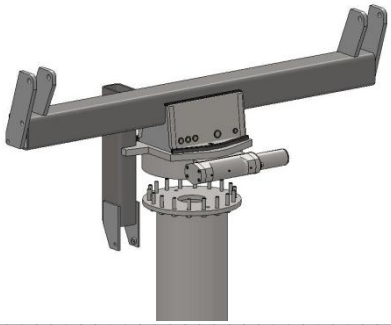
1st step

Assembly of foundation and mast



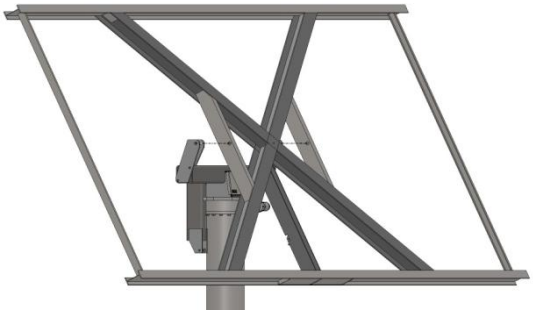
2nd step

Assembly of integrated motor east west



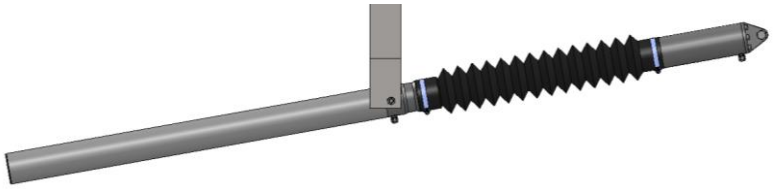
3rd step

Assembly of base frame



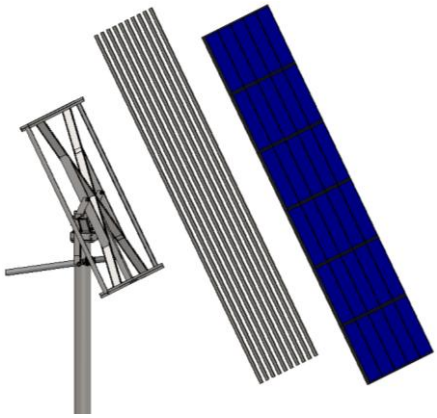
4th step

Assembly of Elevation motor



5th step

Assembly of modules and control unit



Part I - Basics
Scope of delivery

1510001 DEGERtraker 5000HD

Pos.	A-Nr.	Name of item		pc
1		Mast		1
2	8100046	Rotating head 5000HD		1
3	8100027	Base frame 5000HD		1
4	4100039	Elevation-motor EMO HD		1
5	8100019	Boltpack rotating head		1
6	6800003	Tread locking fluid 5g		1
7	8100032	Boomerang II 5000HD		1
8	8910	Assembly instruction		1
9	5100010	Energy converter V		1
10	*	Aluminium profiles F-Set-HD		*
11	6900011	Clamp MTH M10-vz. Nova-Grip	Alu/Base frame	*
12	6900003	Sliding nut M10, 30x20x6	Alu/Base frame	*
13	6100020	Bolt M10x35	Alu/Base frame	*
15	6900010	Clamp MTH M8-vz., Nova-Grip	Solar module	*
16	6900002	Sliding nut M8 18x18x5	Solar module	*
17	6100001	Bolt M8x30	Solar module	*
18	6900015	Clamp plate 25x6, 4x2	Solar module	*
19		Bolt M6	Solar module	*
20	6900001	Sliding nut M6 18x18x5	Solar module	*

1600001 DEGERtraker 6000NT

Pos.	A-Nr.	Name of item		pc
1		Mast		1
2	8100083	Rotating head 6000NT		1
3	8100081	Base frame 6000NT		1
4	4100039	Elevation-motor EMO V HD		1
5	8100019	Boltpack rotating head		1
6	6800003	Tread locking fluid 5g		1
7	8100032	Boomerang II 6000NT		1
8	8910	Assembly instruction		1
9	5100010	Energy converter V		1
10	*	Aluminium profiles F-Set-HD		*
11	6900011	Clamp MTH M10-vz. Nova-Grip	Alu/Base frame	*
12	6900003	Sliding nut M10, 30x20x6	Alu/Base frame	*
13	6100020	Bolt M10x35	Alu/Base frame	*
15	6900010	Clamp MTH M8-vz., Nova-Grip	Solar module	*
16	6900002	Sliding nut M8 18x18x5	Solar module	*
17	6100001	Bolt M8x30	Solar module	*
18	6900015	Clamp plate 25x6, 4x2	Solar module	*
19		Bolt M6	Solar module	*
20	6900001	Sliding nut M6 18x18x5	Solar module	*

Pos. 10 - 20 :

* depending on amount and size of modules

Pos. 19 : For solar module high:

6100111	Bolt M6x30	0.04 - 0-07 inch
6100112	Bolt M6x40	0.07 - 0.11 inch
6100113	Bolt M6x50	0.11 - 0.15 inch
6100115	Bolt M6x60	0.15 - 0.19 inch
6100116	Bolt M6x70	0.19 - 0.23 inch

Optional :

1900003	Inverter holding plate 4´ x 1´ 3´´
1900004	Inverter holding plate 3´ x 1´ 3´´
1900005	Inverter holding plate 2´ x 1´ 3´´
1900007	Security sensor
5100032	Sunlight sensor

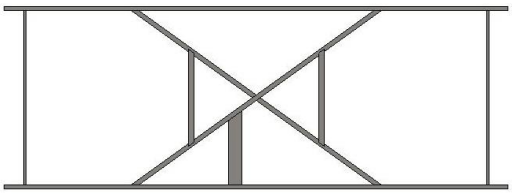
Assembly Instruction
DEGERtraker

Part I - Basics
Scope of delivery

Pos. 1 : Mast

Pos. 2 : Rotating head

Pos. 3 : Base frame

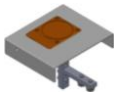


Pos. 4 :Elevation-motor EMO

optional:

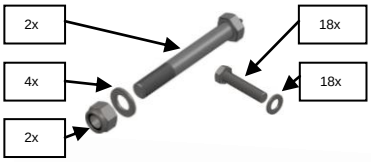
Inverter holding plate

Security Sensor



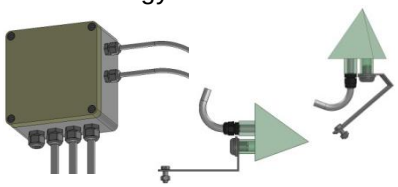
Sunlight Sensor

Pos. 5 : Boltpack rotating head



Pos. 7 Boomerang II

Pos. 9 : Energy converter V



Pos. 10 : Aluminium profiles

Pos. 11: Clamp MTH M10

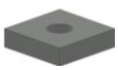
Pos 12: Sliding nut M10

Pos. 13: Bolt M10x35

Pos. 14: Bolt M10x140

Pos. 15: Clamp MTH M8

Pos. 16: Sliding nut M8



Pos. 17: Bolt M8x30

Pos. 18: Clamp plate

Pos. 19: Bolt M6

Pos. 20: Sliding nut M6

Assembly Instruction DEGERtraker

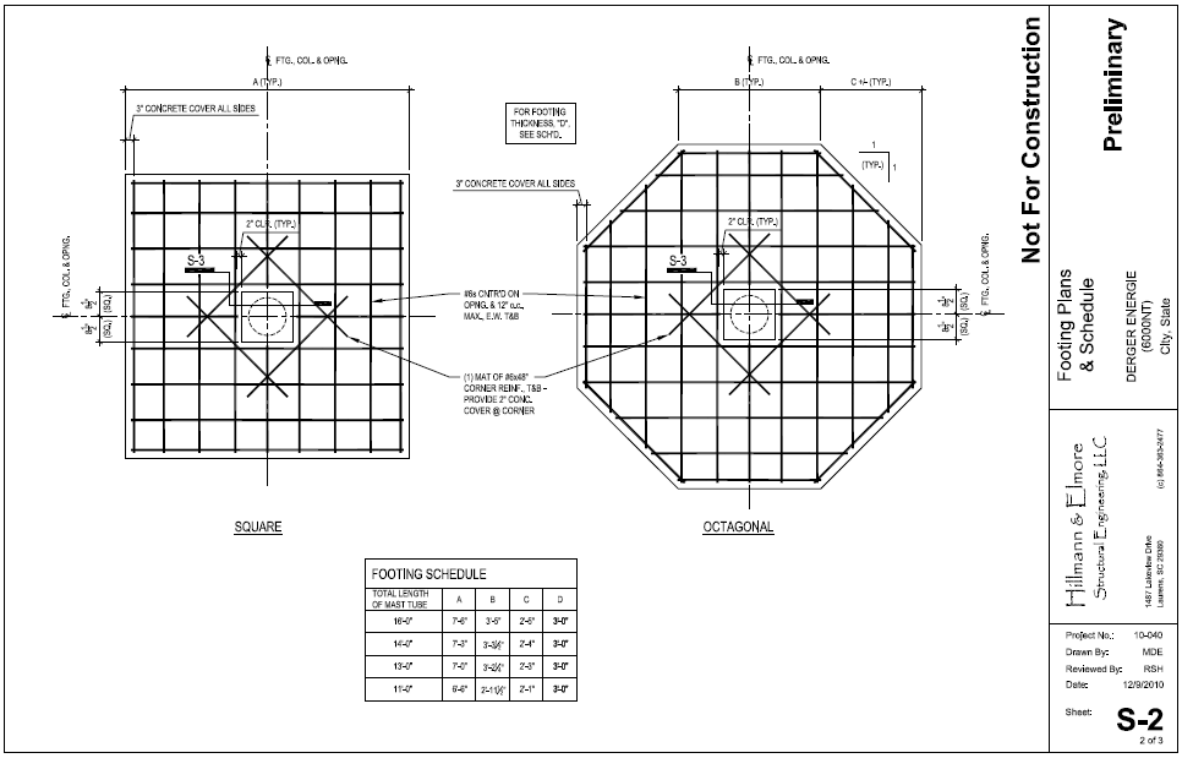
Part II – Foundation and mast Assembley foundation

A qualified professional must be commissioned with creating the foundation.
We recommend having the foundation reinforcement approved by a qualified engineer or technician before concreting.

General requirements:

1. The footing designs shown herein were based on calculations provided by certified and abroved engineering companies and was based on the following design criteria. Verify site specific loading requirements before construction.
   - A. Design wind speed. V..... 105 MPH (5000HD)
     95 MPH (6000NT)
   - B. Ground snow load, Pg.....15 PSF
2. Contractor is responsible for the means, methods, techniques and sequences of construction including temporary shoring and bracing.
3. Contractor shall verify **all** existing conditions and divensions prior to detailing, fabricating and construction notify engineer of any discrepancies.
4. Contractor shall not deviate from the construction drawings without receivings prior approval, in writing, from the engineer.
5. Since no geotechnical information was provided, the following parameters were assumed for the footing designs.These assumptions were considered to be reasonable for the geographic region in which the project is located, if necessary, the owner/contractor should verify the actual soil conditions through geo-technical engineering analysis, global stability was neither investigated nor part of hese´s scope, consult a geotechnical enginieer for this service:
   - A. Allowable bearing capacity, q.....1500 PSF
   - B. Passive soil pressure coefficient, Kp.....3.00
   - C. Coefficient of sliding friction, µ..... 0.40

A formwork and reinforcement drawing for the particular foundation, as shown below, can be obtained for each DEGERtraker on request – you must observe the instructions given in the drawings! This drawing will be sent with the order confirmation. The drawing shown is only intended as a sample drawing.



Assembly Instruction DEGERtraker

Part II – Foundation and mast
Assembley foundation

Concrete:

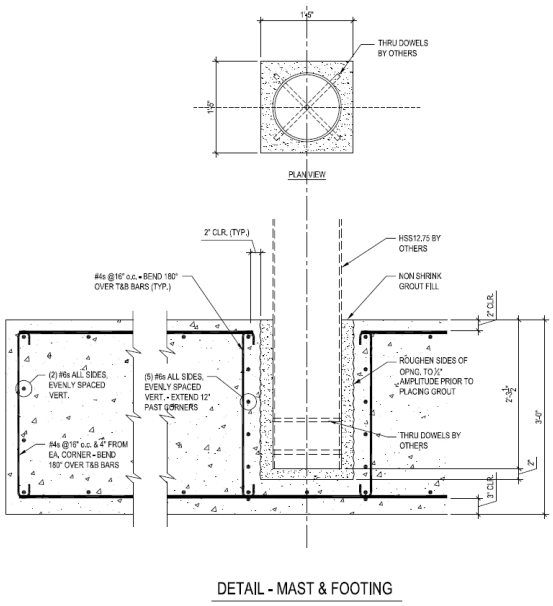
1. Comply with ASTM C94; ACI 301; “Specifications for structural concrete for buildings”; ACI 318; “Building code requirements for structural concrete” and the CRSI “Manual of standard practice”.
2. Reinforcing bars shall meet the requirements of ASTM A615, GRADE 60, and all splices shall be a minimum of (40) bar diameters unless noted otherwise.
3. Portland cement shall meet the requirements of ASTM C150, TYPE 1.
4. Fly ash shall meet the requirements of ASTM C618, TYPE F limited to 15% of total cement content.
5. Proportion normal-weight concrete to provide the following:
   A. Compressive strength, fc=3000psi
   B. Air content: 5.5% to 7% for concrete expose to freeze-thaw cycles, and 2.0% to 4.0% elsewhere.
6. Do not add water to concrete during delivery at the site or during placement unless appoved in writing by the engineer.
7. Protect concrete from physical damage or reduced stength from weather extremes during mixing, placing and curing. Repair surface defects as required.
8. Do not use calcium chloride in concrete mix.
9. Non-shrink grout shall have a minimum conpressive strength of 4000psi, shall be non-metallic and meet the requirements of ASTM C1107.

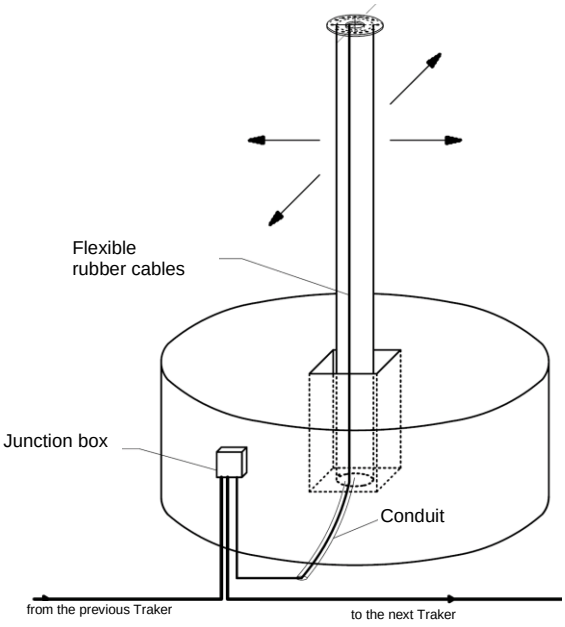
Next Step:

- Insert mast into the foundation receiving part. **You do not have to take account of the location of the bores in the flange. ATTENTION: Conduit must be inside the mast**
- Align mast vertically
- Affix mast
- Concrete and compact **receiving part and column base** to the top edge of the foundation using non shrink grout fill. **The concrete should be allowed to harden for at least 2 days before any further installation work is done!**

ATTENTION! Cable guide
We recommend you attach a junction box to the side of the foundations, as shown in the adjacent drawing. The cables from the junction box to the rotating head must be designed as flexible rubber cables.

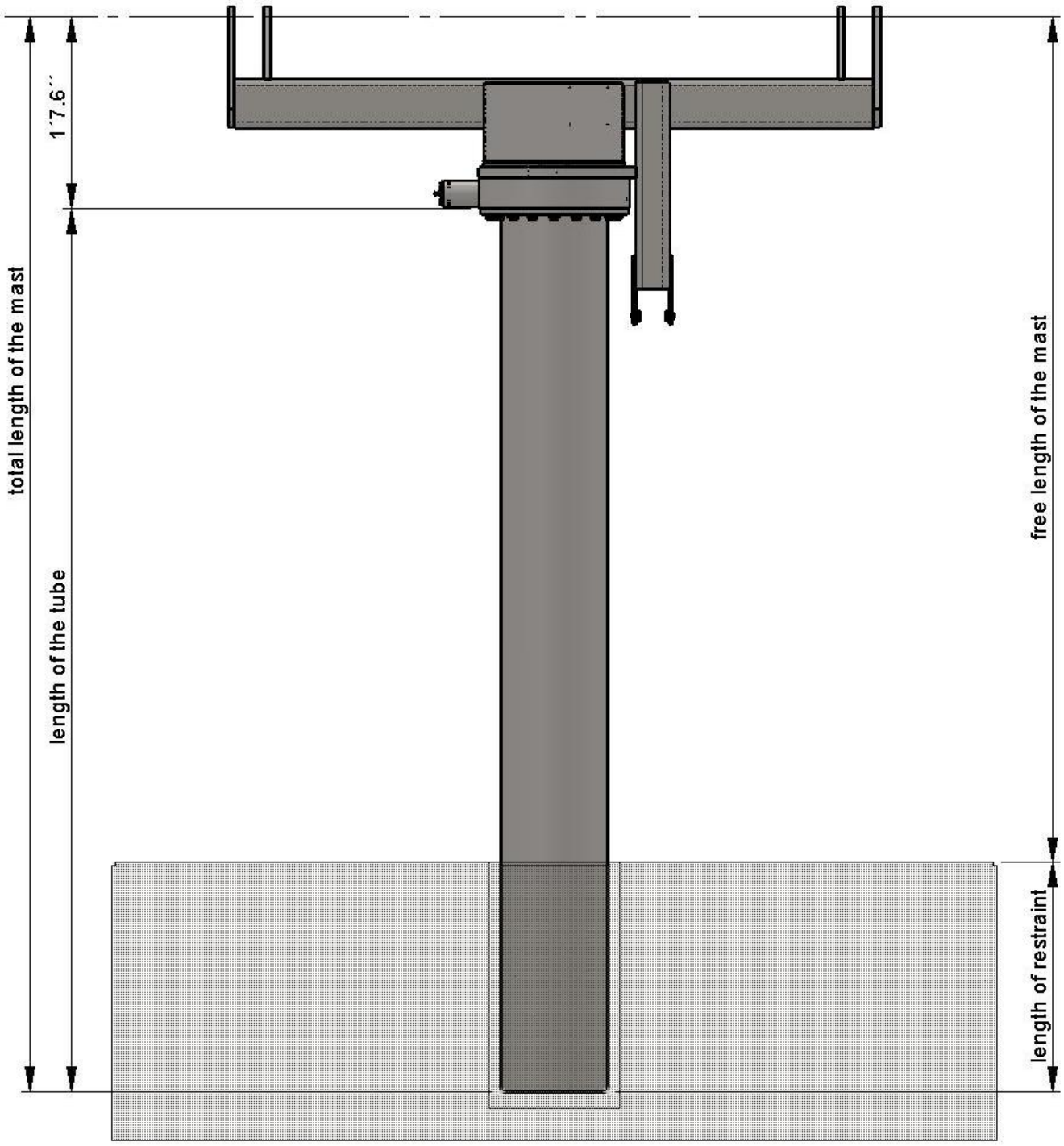
The drawings shown are only intended as a sample drawing


THRU DOWELS BY OTHERS
PLAN VIEW
2" CLR. (TYP.)
HSS12.75 BY OTHERS
NON SHRINK GROUT FILL
ROUGHEN SIDES OF OPNG. TO ½" AMPLITUDE PRIOR TO PLACING GROUT
THRU DOWELS BY OTHERS
DETAIL - MAST & FOOTING



Part II – Foundation and mast Dimensions

NOTE: The measurements and dimensions listed have been calculated according to ASCE-code and should be understood as a guide values. National norms, directives and materials must also be taken into consideration. Foundation plans can be made available on request!!



Assembly Instruction DEGERtraker

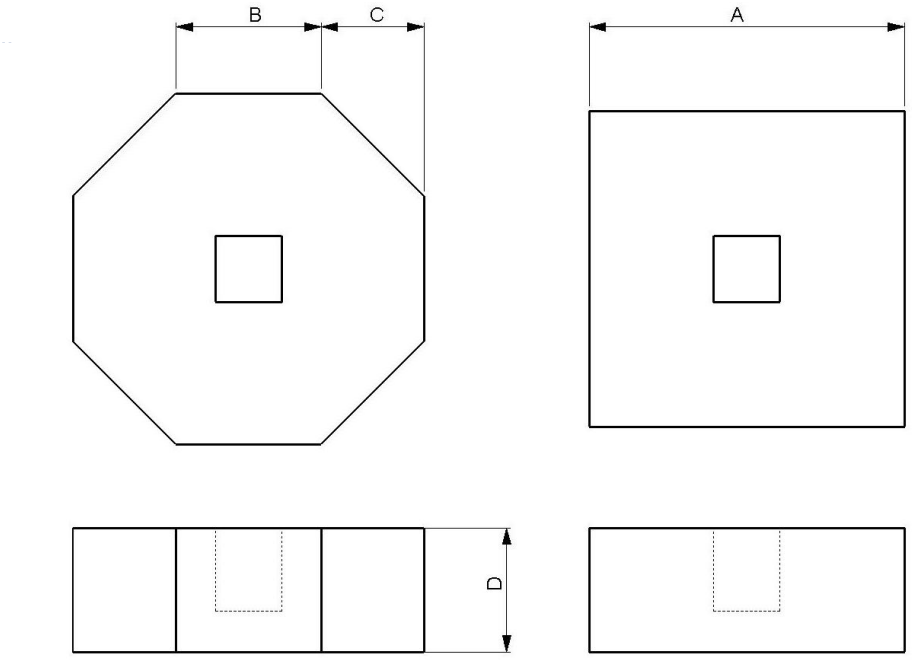
Part II – Foundation and mast Dimensions

DEGERtraker 5000HD

solarmodule area sq ft	total length of the mast	length of the tube	length of restraint	mast cross section Ø / wall thickness inch	mast weight lb	foundation dimensions octagonal B x C x D	foundation dimensions square A x A x D
430	10´7.6´´	9´-0´´	2´3½´´	tube 12.75 x 0.375	485	2´-10´´ x 2´-0´´ x 3´-0´´	6´-3´´ x 6´-3´´ x 3´-0´´
430	12´7,6´´	11´-0´´	2´3½´´	tube 12.75 x 0.375	540	3´-3½´´ x 2´-4´´ x 3´-0´´	7´-3´´ x 7´-3´´ x 3´-0´´
430	14´7,6´´	13´-0´´	2´3½´´	tube 12.75 x 0.375	685	3´-5´´ x 2´-5´´ x 3´-0´´	7´-6´´ x 7´-6´´ x 3´-0´´
430	15´7,6´´	14´-0´´	2´3½´´	tube 12.75 x 0.375	735	3´-6¼´´ x 2´-5¾´´ x 3´-0´´	7´-9´´ x 7´-9´´ x 3´-0´´
430	17´7,6´´	16´-0´´	2´3½´´	tube 12.75 x 0.5	1080	4´-0´´ x 2´-10´´ x 3´-0´´	8´-9´´ x 8´-9´´ x 3´-0´´

DEGERtraker 6000NT

solarmodule area sq ft	total length of the mast	length of the tube	length of restraint	mast cross section Ø / wall thickness inch	mast weight lb	foundation dimensions octagonal B x C x D	foundation dimensions square A x A x D
570	12´7,6´´	11´-0´´	2´3½´´	tube 12.75 x 0.375	540	2´-11½´´ x 2´-1´´ x 3´-0´´	6´-6´´ x 6´-6´´ x 3´-0´´
570	14´7,6´´	13´-0´´	2´3½´´	tube 12.75 x 0.375	685	3´-2¼´´ x 2´-3´´ x 3´-0´´	7´-0´´ x 7´-0´´ x 3´-0´´
570	15´7,6´´	14´-0´´	2´3½´´	tube 12.75 x 0.375	735	3´-3½´´ x 2´-4´´ x 3´-0´´	7´-3´´ x 7´-3´´ x 3´-0´´
570	17´7,6´´	16´´-0´´	2´3½´´	tube 12.75 x 0.5	1080	3´-5´´ x 2´-5´´ x 3´-0´´	7´-6´´ x 7´-6´´ x 3´-0´´



All dimensions expressed in feet and inch

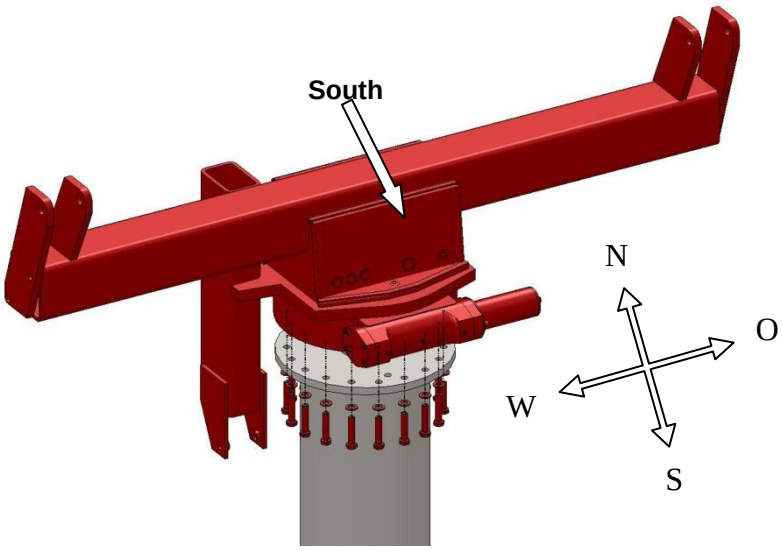
Assembly Instruction
DEGERtraker

Part III - Structure
Assembly integrated motor east-west and boomerang

1st step:

set rotating head onto the flange
on the top of the mast.

The drive unit should roughly point south
(+/- 30°) while being screwed tight.



2nd step:

screw rotating head with the flange by
using bolts M16x50 and washers M16.

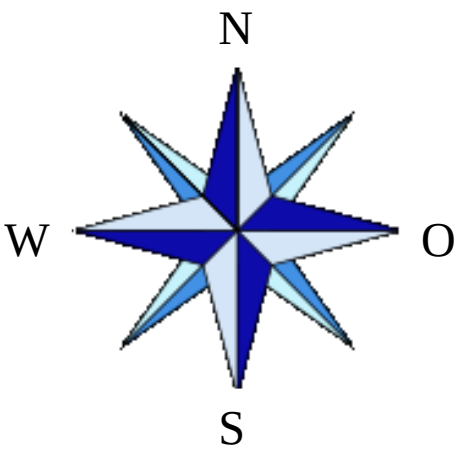
torque 200Nm

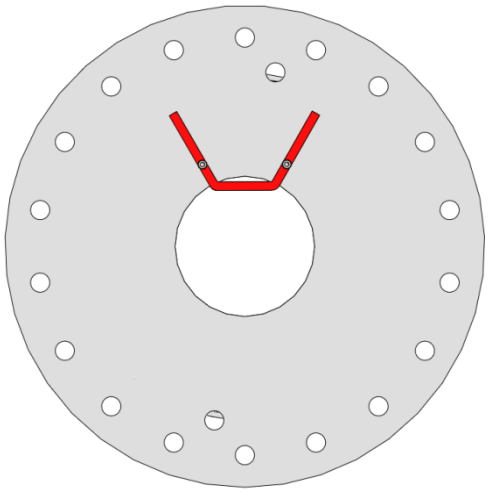
Weight of rotation head	
DEGERtraker 5000HD, 6000NT	573 lb

3rd step:

Mounting boomerang at the mast flange.

The tip of the “boomerang” must point in a southward direction (+/-3°). Use a GPS device or refer to the surveyor’s plan of the property to determine the south position. A compass is not precise enough.
As the boomerang is operating the end-limit-switch and with this the final position of the east-west-axis is set, an exact arrangement is necessary.
To determine south-direction for a proper arrangement of the tracking system a special document can be ordered.

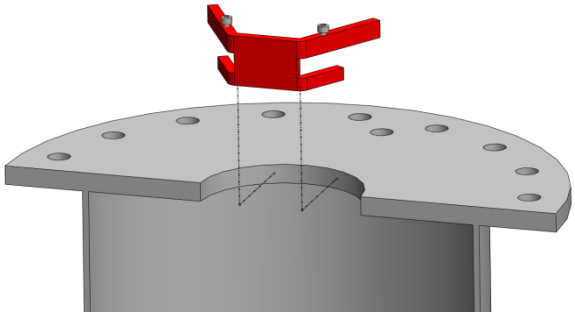


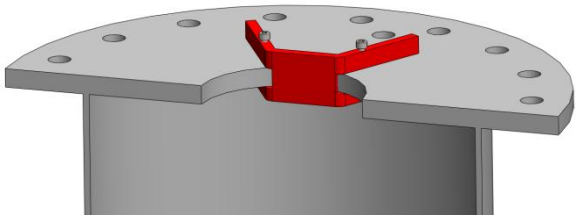


The position of the bore holes is irrelevant.

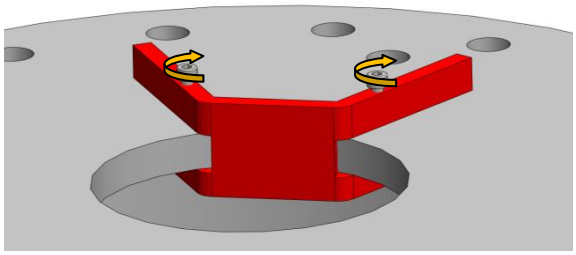
Part III – Structure
Assembly boomerang and limit switch

Push the boomerang as shown at the mast flange and fix it with the screws M5x18.





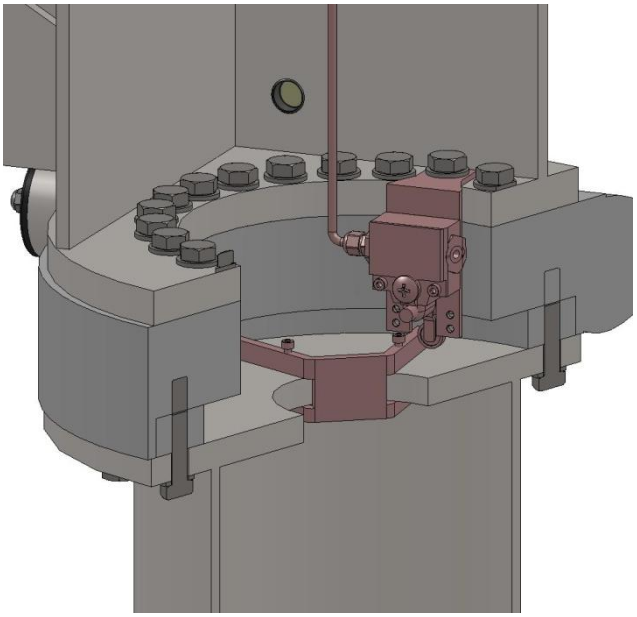
torque 6.5Nm

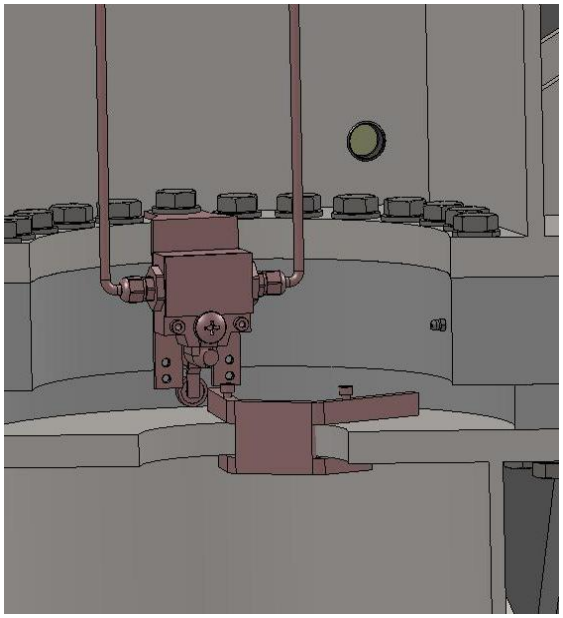


4th Step:

Attach the limit switch setting azimuth in the free bore on the rotating head.

Make sure that the switch flag terminals make contact upon operation of the boomerang and that the rotation movement is stopped.





Assembly Instruction
DEGERtraker

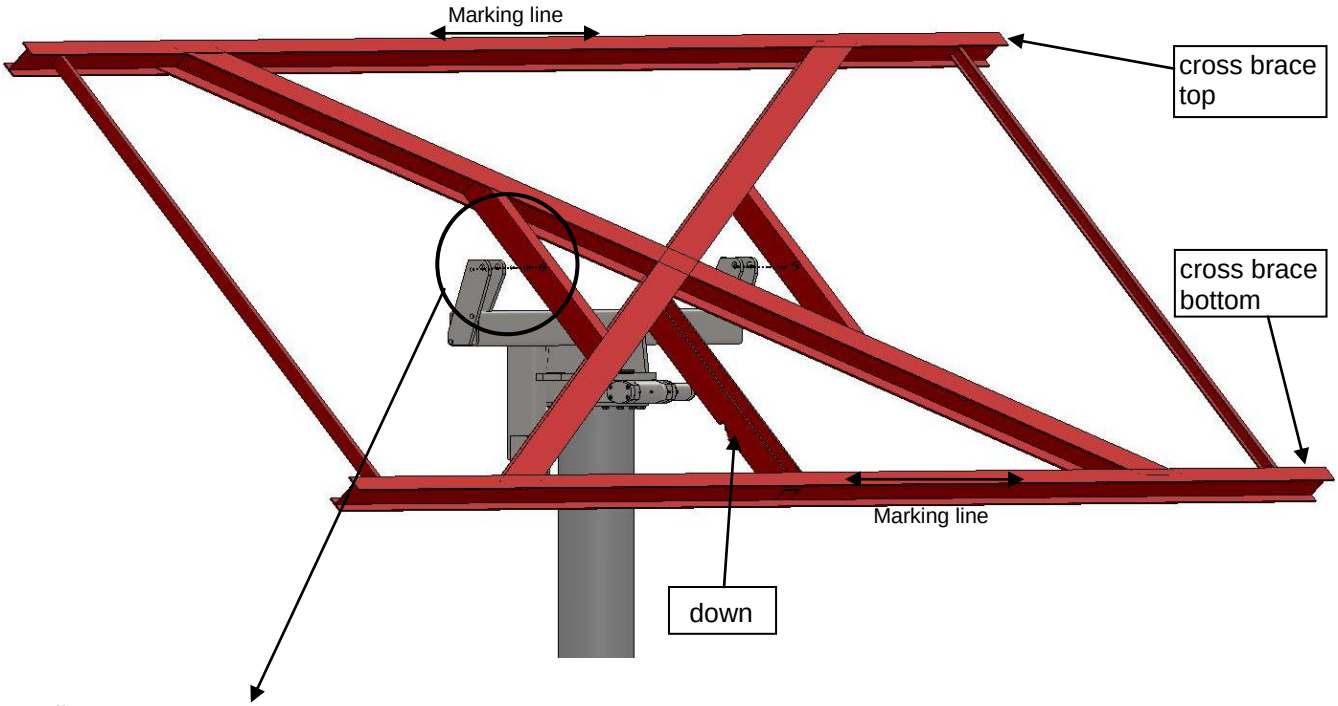
Part III – Structure
Assembly base frame

Before installing the supporting frame, it is advisable to mark the positions of the aluminium profiles on the side of the top cross brace and the bottom cross brace – according to the description Part IV.
Labelling must always be from the centre of the cross brace to the outside.

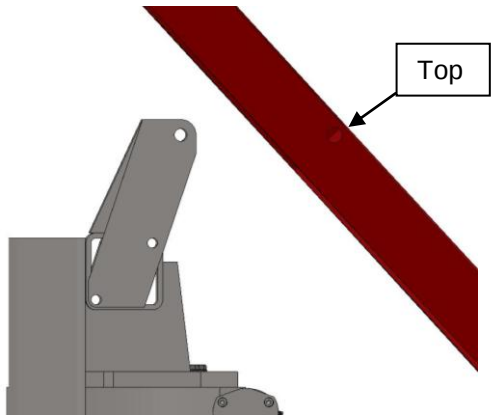
1st step:

Suspend the base frame by using a crane in such a way that the bore holes at the tip of rotation of the base frame are at the top and the connection for the Elevation motor (EMO) is on the left.

5000HD / 6000NT:



Detail:



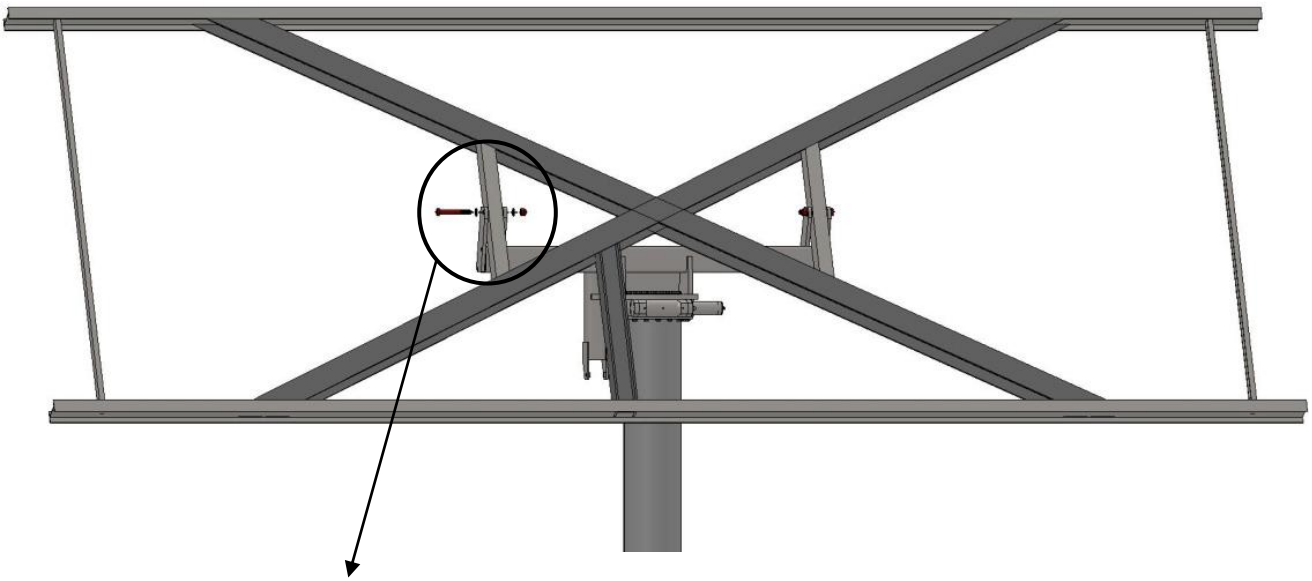
Weight of base frame

DEGERtraker 5000HD	**1323 lb**
DEGERtraker 6000NT	**1433 lb**

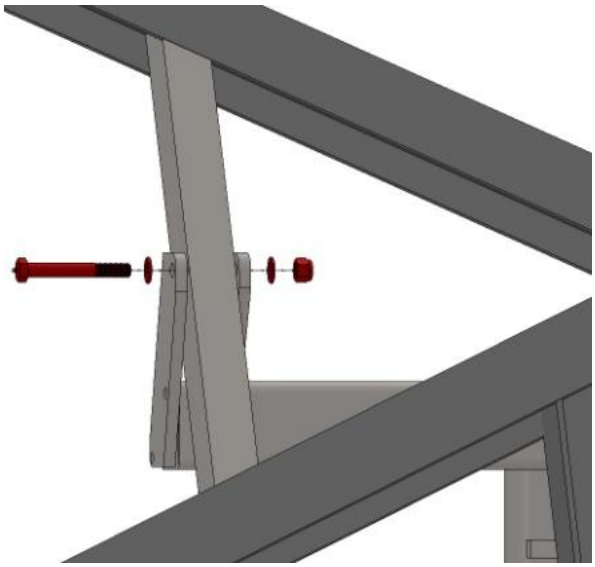
Part III – Structure
Assembly base frame

2nd step:

Built in bolt M24x180 with washer M24 and nut M24. Do not screw the bolts too tightly, to ensure that the shackles at the rotating head are not pressed together.



Detail:



WARNING!!

Slide bearing bushings are installed at the rotation point of the base frame – these must be slightly lubricated in the initial installation. Later on lubrication is possible at any time through a lubricating nipple in the bolt M24x180. A list of suitable lubricants you find on page VII-3.

Mounting the modules on the base frame beforehand is **not permitted!!**

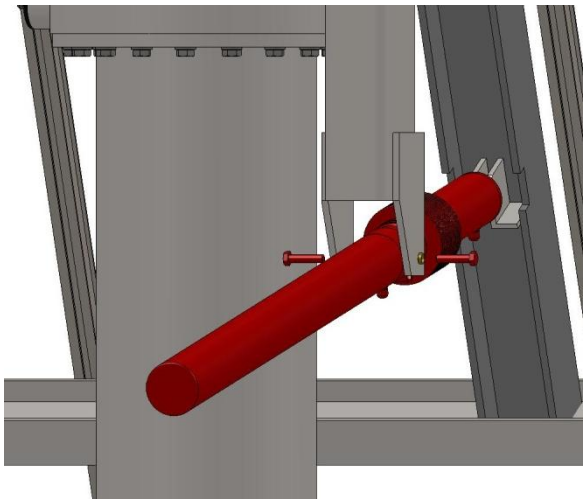
Assembly Instruction
DEGERtraker

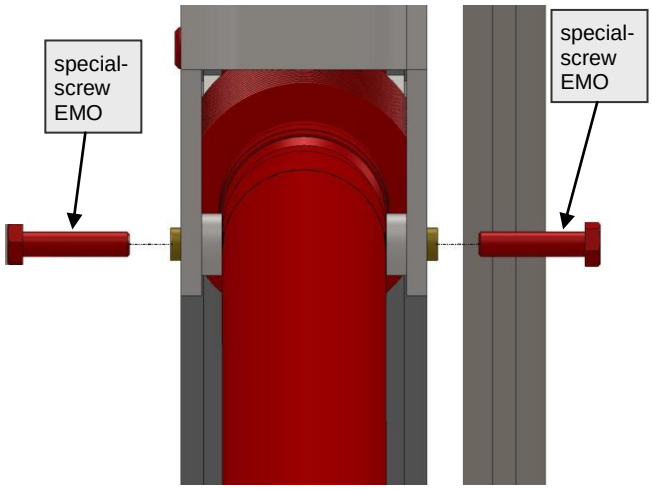
Part III – Structure
Assembly Elevation-Motor (EMO)

1st step:

The EMO is delivered with preset limit switches so no set up work has to be done at all.

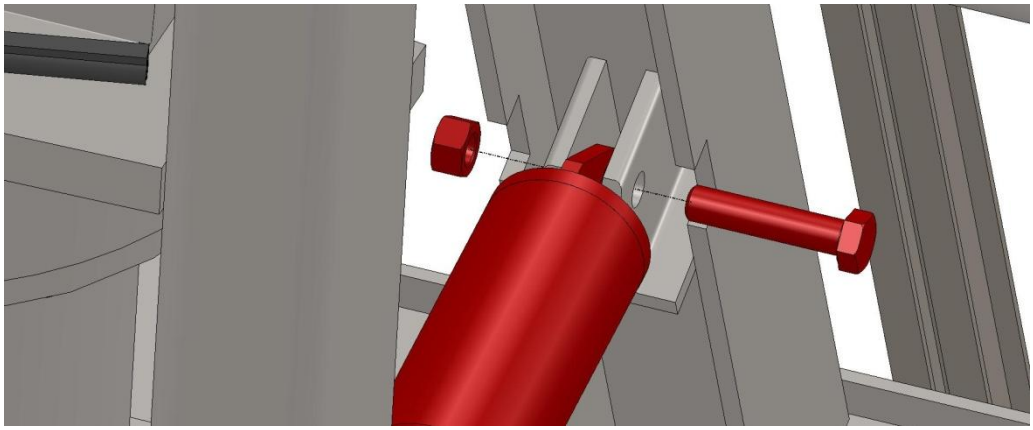
Fix Elevation motor at the rotation head by using the special screws EMO. Therefore the enclosed thread locking fluid has to be used. Tighten the special screws. **Torque: 50 Nm**.





2nd step:

Fix Elevation motor (EMO) at the base frame by using bolt M20x80 and nut M20



Attention!!
- Do not use any other screws except those included in the delivery!
- Apply max. one drop of the locking fluid to the internal thread of the EMO. Ensure that **no** locking fluid enters into the sliding bearing connector!
- The cable connections for the elevation motor must be at the bottom!!
- In both holding fixture points the Elevation motor must be movable.

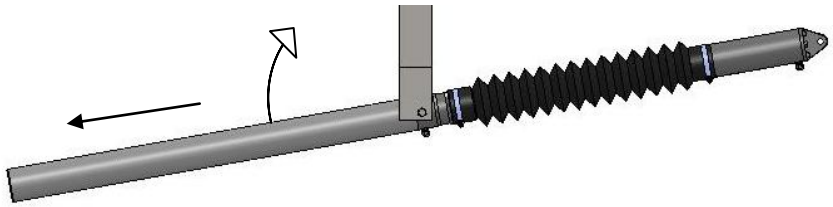
Assembly Instruction
DEGERtraker

Part III – Structure
Assembly Elevation-Motor (EMO)

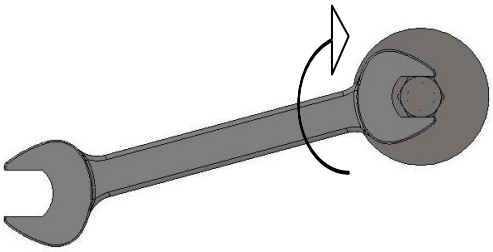
IMPORTANT: Disconnect the Elevation-Motor from the Energy-Converter by loosen clamp 1 and 2 before beginning with this work.

Manual operation:

When electrical components fail the systems can be moved into the horizontal position by using a 12V or 24V batterie.



When all electrical components fail the systems can be moved into the horizontal position by using standard tools. For this the Aluminium-Cover at the lower side of the elevation motor has to be removed. After this apply a spanner wrench (size 17mm) at the hexagonal nut at the end of the elevation motor and turn slowly (max. 30°/sec ==> 5 Upm) clockwise.



Operating Instructions!!

The expansion bellows may not be pinched, blocked or compressed, since this can lead to damage to the internal parts.

A mechanical blockage of the movement of the piston rods is to be avoided since this can lead to damage to the drive system.

The linear actuator must come to a complete stop before changing the movement direction.

A fast reversal of the travel direction of the actuator (for example with the aid of the CCB) is not permitted.

Checking of the mechanics

Extend and retract the complete way of the drive, to guarantee that the mechanics moves freely, does not knock against anything and that the cables are long enough. Use a 12V or 24V batterie (for ex. suitable for a batterie-driven drill) for the head of the drive.

Assembly Instruction DEGERtraker

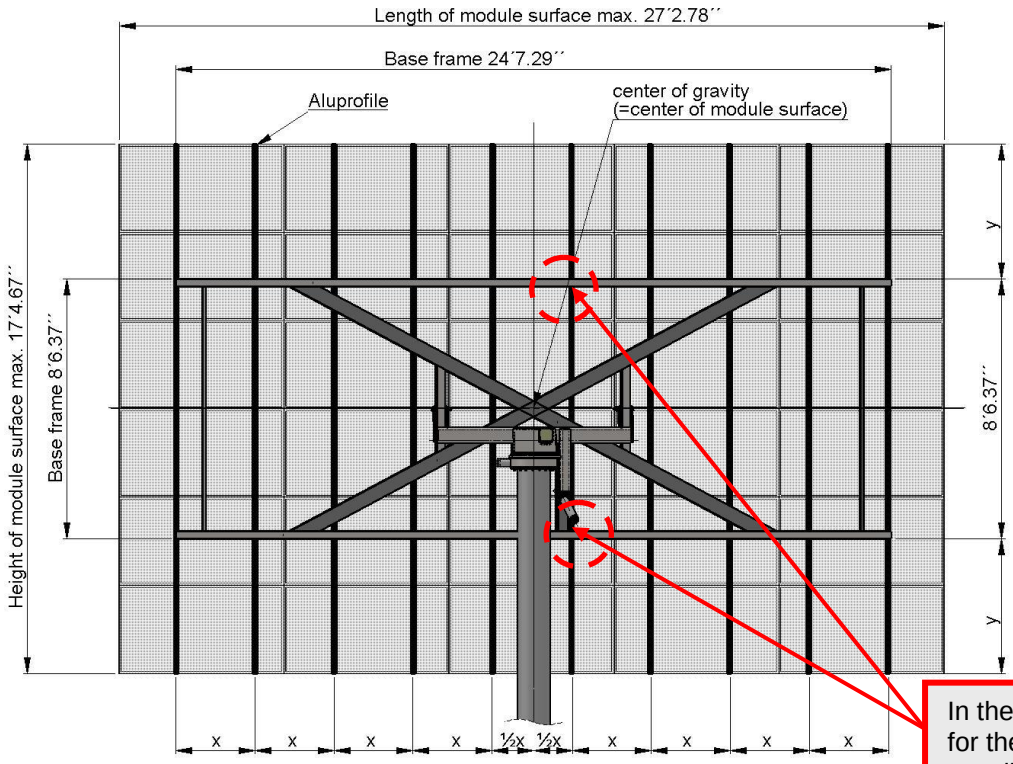
Part IV – Module carry system DEGERtraker 5000HD

Module arrangement:

The following dimensions have to be abode and have to be reduced according to regional conditions if necessary:

- Module surface: **max. 430 sq ft**
- length of Module surface: **max. 27´ 2.78´´**
- height of Module surface: **max. 17´ 4.67´´**

The total module area is to be determined relative to the site with the aid of the DEGERenergie dimensioning tool and may in no case be greater than 430 sq ft.



In the range of the suspension for the elevation motor it is not possible to assemble the MTH-clamps at the outside of the base frame. Here the MTH-clamps have to be assembled at the inside of the base frame. Please pay attention to notes in step 2!

1st step: Arrangement of aluminium profiles:

Distance between 2 aluminium profiles: **x** = width of module / 2
(attend the point of fastening from the modul manufacturer)

Overhang of the aluminium profile: **y** = (length of aluminium profile - 8´ 6.37´´) / 2

Following points have to be attended:
- assemble aluminium profile from the middle to the outsite
- in both axis modules have to be arranged symmetrically to the center of gravity
- 2 aluminium profiles for each row of modules
- attend the connecting socket on the backside of the modules

2nd step: Assembly of aluminium profiles see Page IV-3!

Assembly Instruction DEGERtraker

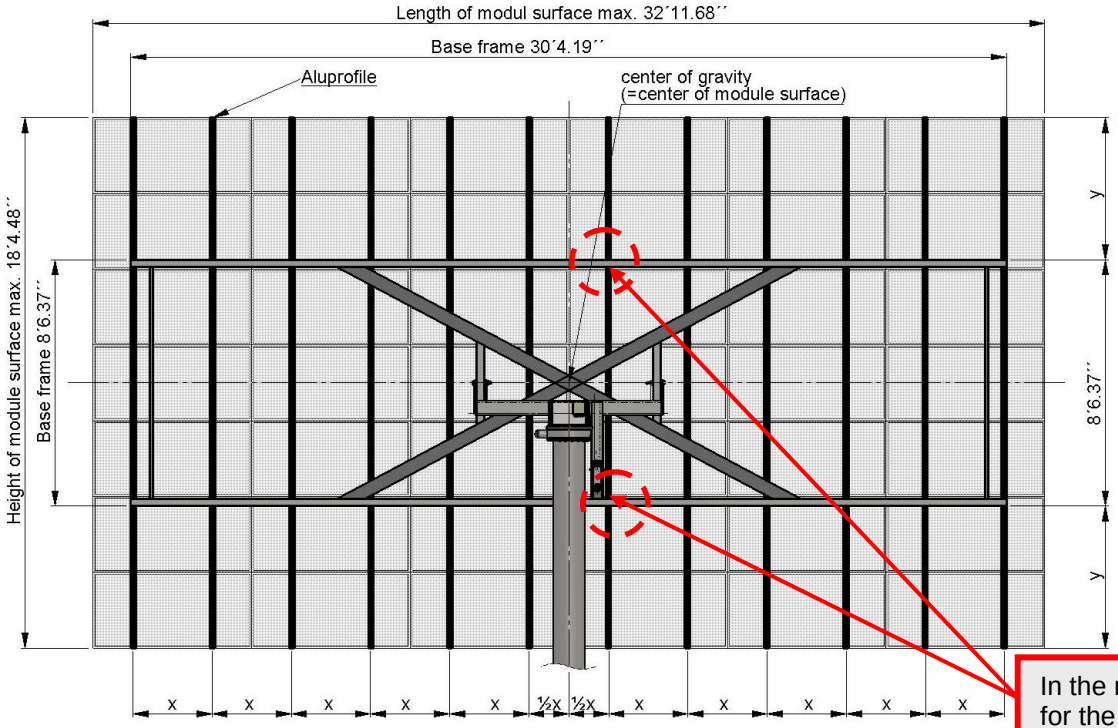
Part IV – Module carry system DEGERtraker 6000NT

Module arrangement:

The following dimensions have to be abode and have to be reduced according to regional conditions if necessary:

- Module surface: **max. 570 sq ft**
- length of Module surface: **max. 32´ 11.68´´**
- height of Module surface: **max. 18´ 4.48´´**

The total module area is to be determined relative to the site with the aid of the DEGERenergie dimensioning tool and may in no case be greater than 570 sq ft.



In the range of the suspension for the elevation motor it is not possible to assemble the MTH-clamps at the outside of the base frame. Here the MTH-clampshave to be assembled at the inside of the base frame. Please pay attention to notes in step 2!

1st step: Arrangement of aluminium profiles:

Distance between 2 aluminium profiles: **x** = width of module / 2
(attend the point of fastening from the modul manufacturer)

Overhang of the aluminium profile: **y** = (length of aluminium profile - 8´ 6.37´´) / 2

Following points have to be attended:
- assemble aluminium profile from the middle to the outsite
- in both axis modules have to be arranged symmetrically to the center of gravity
- 2 aluminium profiles for each row of modules
- attend the connecting socket on the backside of the modules

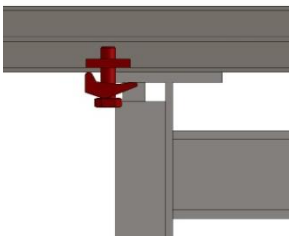
2nd step: Assembly of aluminium profiles see Page IV-3!

Assembly Instruction
DEGERtraker

Part IV – Module carry system
Assembly of aluminium profiles and the modules

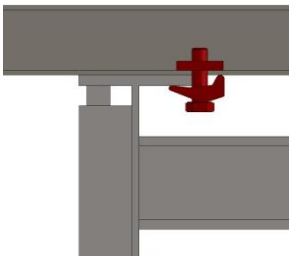
2nd step: Assembly of aluminium profiles
(DEGERtraker 5000HD, 6000NT)

Assemble aluminium profile **on both sides at the outside** of the base frame by using clamp MTH, bolt M 10 x 35 and sliding nut M10.



The clamp MTH has to slide along inside the aluminium profile towards the base frame until the bolt contacts the base frame

In the range of the suspension for the elevation motor it is not possible to assemble the MTH-clamps at the outside of the base frame. Here the MTH-clamps have to be assembled at the inside of the base frame.



torque: 35NM

Tip:

Bring the DEGERtraker in a horizontal position – then it will be easier to mount the moduls

3rd step: Assembly of the modules

WARNING!

The total module area is to be determined relative to the site with the aid of the DEGERenergie dimensioning tool and may in no case exceed the maximum allowable total module surface.

Maximum total module surface

DEGERtraker 5000HD:	**430 sq ft**
DEGERtraker 6000NT:	**570 sq ft**

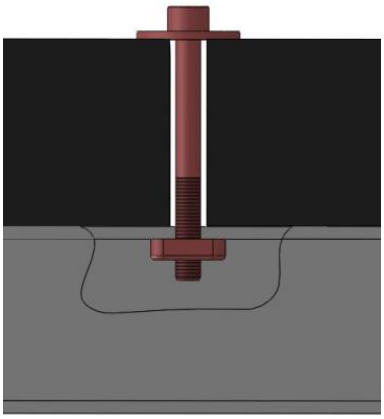
Defects resulting from a too large module surface are not covered by the warranty. As soon as the solar modules are installed you have to install a functioning windguardt or the module surface has to stay in a horizontal position. Because the elevation motor is not completely self-locking, it is possible that the module surface can move to a steeper position in strong winds. In order to avoid this situation, the motor connections should be kept short. It is recommended that the module surface position be inspected on a daily basis until commissioning is finalized!

Assembly of the modules is permitted only on the already-assembled base frame.
Module assembly beforehand is not permitted.

Assembly Instruction DEGERtraker

Part IV – Module carry system
Assembly of the modules

Between the modules



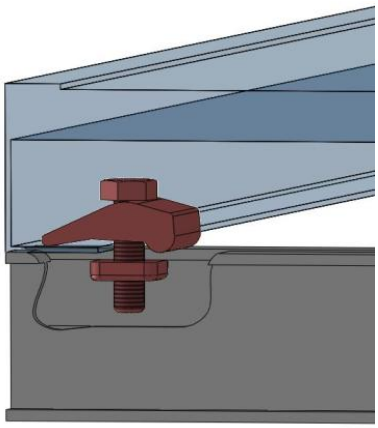
Assemble modules on the aluminium profiles by using bolt M6, clamp plate and sliding nut M6. The distance between the modules must not be more than the thickness of the bolt..

In order to achieve the most precise symmetry, it is advisable to install the modules from the centre outwards.

WARNING!!

We strongly recommend that a gap of approximately 2 mm be left between the individual module rows.

At the end of the module-surface



Assemble modules on the alumnium profiles by using clamp MTH, bolt M8x30 and sliding nut M8
torque: 18NM

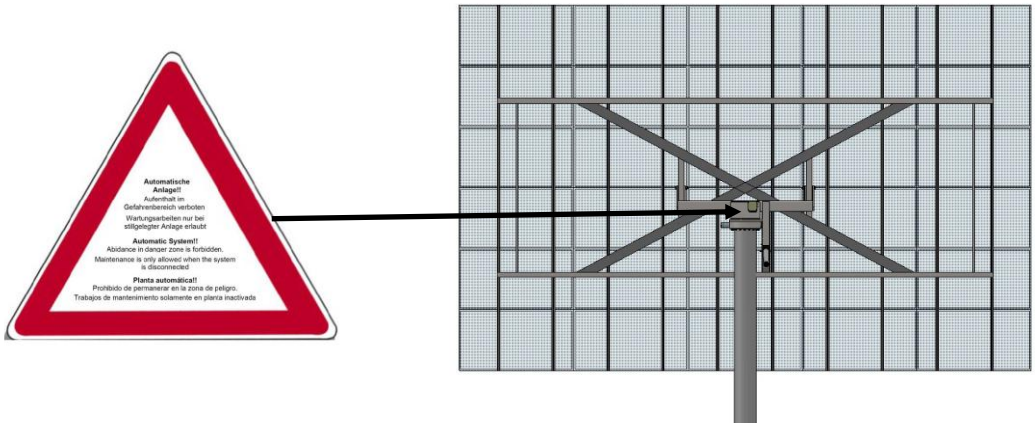
The design of some modules does not allow clamping with MTH clamps. If that is the case, the terminal connections included in the scope of delivery must be used
torque:20NM

ATTENTION:

Extend and retract the complete way of the drive, to guarantee that the mechanics move freely, don't knock against anything and that the cables are long enough.

AFFIX WARNING NOTICE

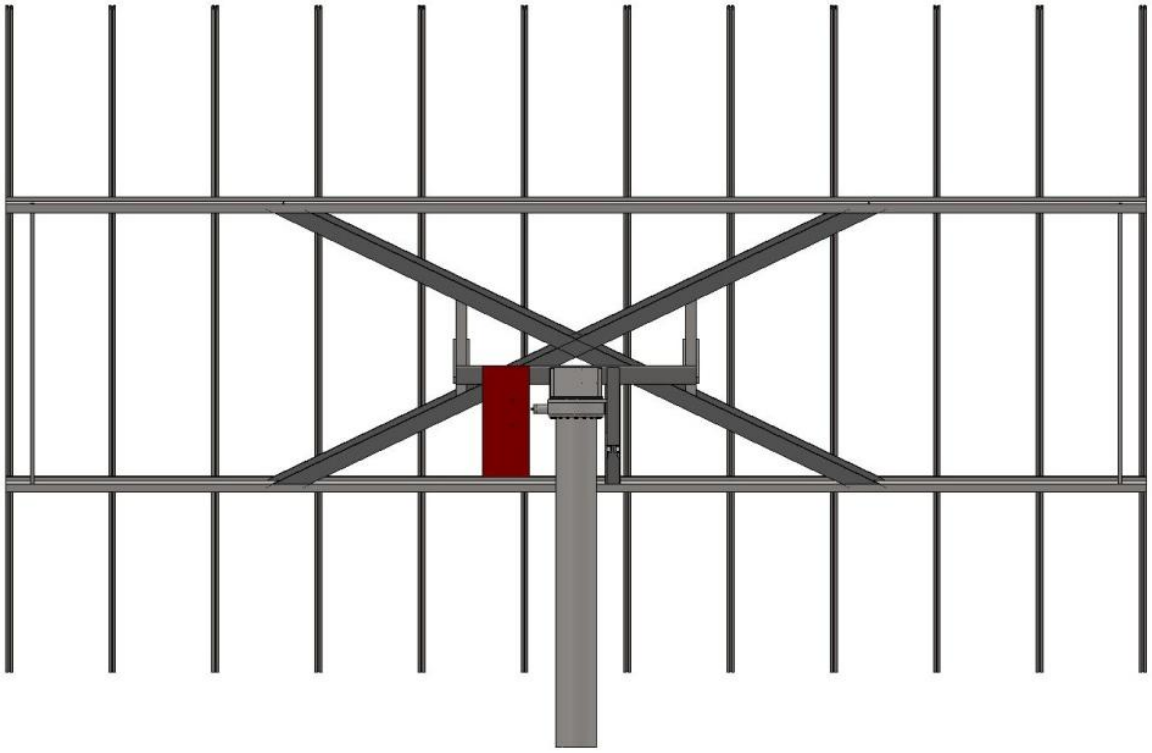
The delivered warning notice has to be affixed to the mast of every system well observeable.


Automatische Anlage!!
Aufenthalt im Gefahrenbereich verboten
Wartungsarbeiten nur bei stillgelegter Anlage erlaubt
Automatic System!!
Abidance in danger zone is forbidden.
Maintenance is only allowed when the system is disconnected
Planta automática!!
Prohibido de permanecer en la zona de peligro.
Trabajos de mantenimiento solamente en planta inactivada

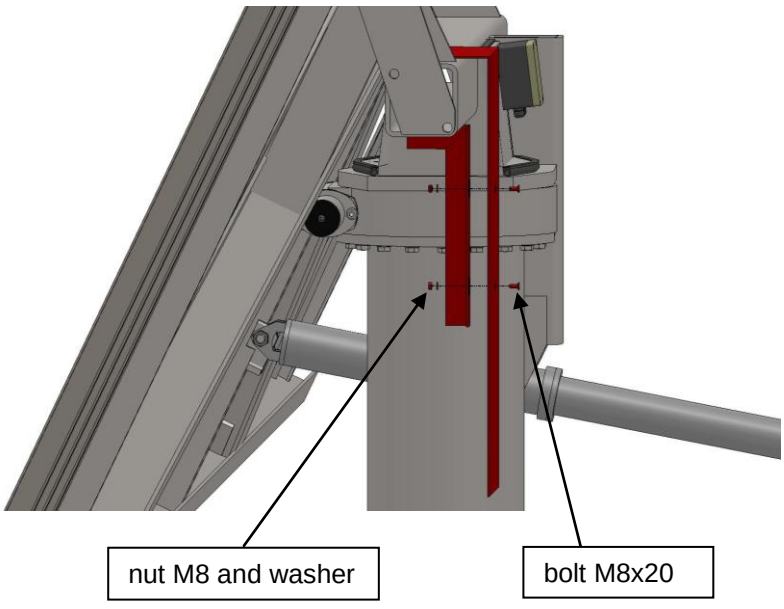
Part IV – Module carry system
Assembly inverter holding plate (optional)

Assembly inverter holding plate
(optional)**:**

Hang up the inverter holding plate directly at the traverse of the rotating head



Save the plate against lift-off by using the framing square, bolts M8x20 and nut M8 and washer..

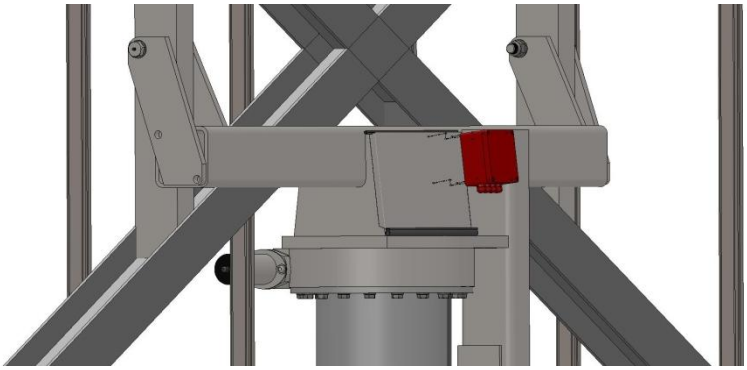


Assembly Instruction DEGERtraker

Part V – Control unit
Assembly control unit

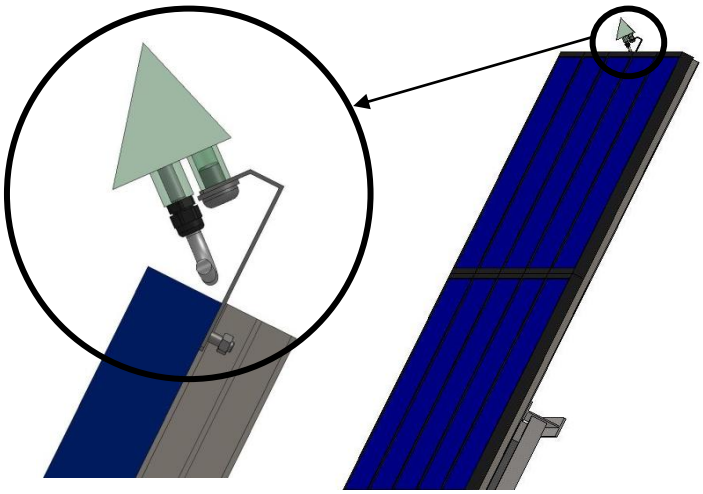
1st step: Fixing energy converter

Fix the energy converter at the cover of gear casing of the rotating head by using the provided screws M3.9 x 13. Therefore prefabricated holes are in the cover.



2nd step: Controling the east-west axis

Mount the DEGER**conecter** with the inscription ‘Ost-West pointing **UPWARDS** above the solar module surface.

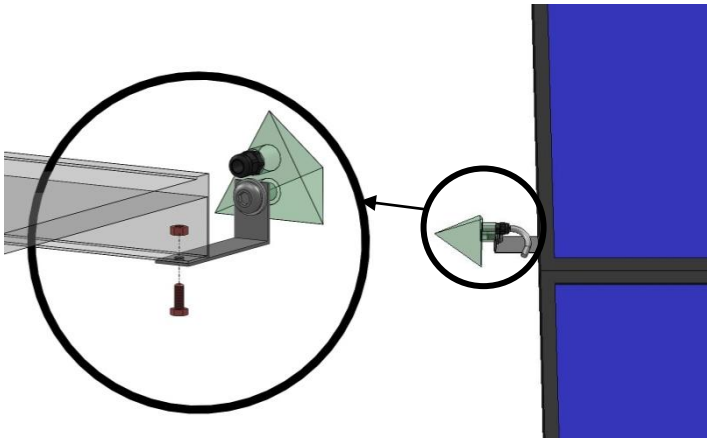


Connect the cable of the azimut-actuator (drive motor east-west)
blue cable connection 3
brown cable connection 4

Function test:
Check if the drive rotates the module surface towards the brightest spot in the sky. If you are not sure, you can cover a sensor cell at the DEGER**conecter** with your hand – now the module surface should rotate in the direction of the non-covered sensor cell.
Otherwise change connection 3 / 4

3rd step:
Controlling the elevation axis

Mount the DEGER**conecter** with the inscription ‘elevation’ **LATERALLY** at the solar module surface. (left side; seen from the front side)



Connect the cable of the elevation-actuator (drive motor for elevation)
blue cable connection 1
brown cable connection 2

Function test:
Check if the drive rotates the module surface towards the brightest spot in the sky. When the sky is cloudy the control will move the module surface into the horizontal. In this case, too, if you are not sure, you can cover a sensor cell at the DEGER**conecter** – then the module surface should rotate in the direction of the non

Assembly Instruction
DEGERtraker

Part V – Control unit
Functional characteristics - arrangement check

A technology to rely on.

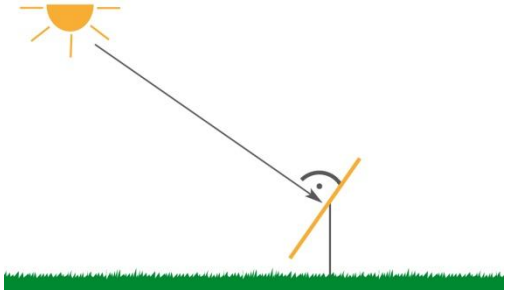
The fact that the patent-protected control system and the utility model-protected mechanical system were awarded the inventor's prize of the federal state of Baden-Württemberg in South-Germany in 2000 shows that the DEGER**traker** meets the demands of both experts and investors.

Functioning

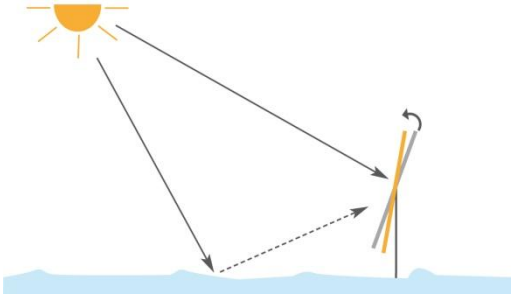
The DEGER**conecter** control unit detects the brightest spot in the sky and adjusts the module surface's position to face it. The DEGER**traker's** mechanical system allows the accurate adjustment of the module surface to the sun all year round. **This technology also works in cloudy, rainy or foggy conditions.** If, for example, a day starts off sunny with clouds moving in from the west in the afternoon, the module surface will then move back slightly towards the east. On a completely overcast day, the module surface is adjusted to a horizontal position, or to face the point of the strongest irradiation. This allows to make the most out of adverse weather conditions.

The control unit is designed to work preferably efficiently and only to do activities that cause a direct increment of the solar yield. In particular the system doesn`t move east globally at night but does this with the sunrise in the morning.

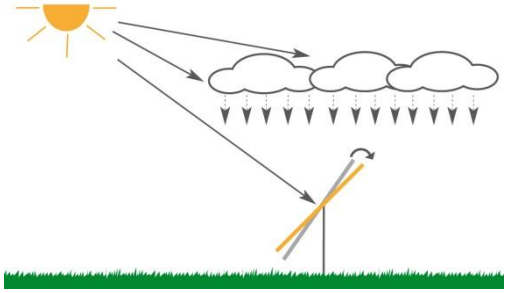
with bright sunshine:



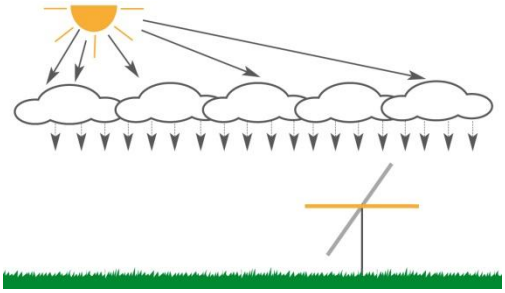
with a covering of snow or water and cloudless sky :



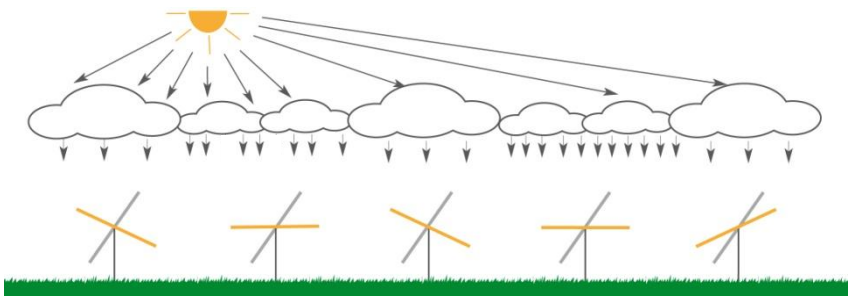
with sunshine and thin or scattered clouds:



with an uniformly overcast sky:



with clouds of differing thickness above a solar park with DEGER**traker**:



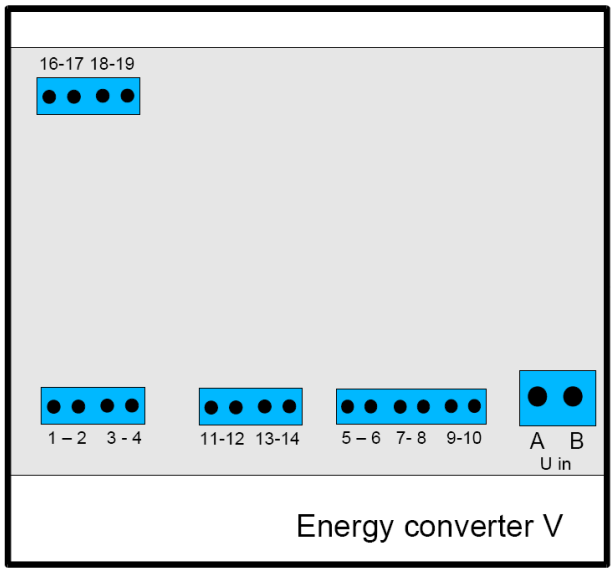
Assembly Instruction
DEGERtraker

Part V – Control unit
Data sheet energy converter V

Data sheet energy converter V

Power supply of the DEGER**conecter** and the drive

- **for power net feed systems of 80V...380V DC**
- **or 80...265V AC (Grid)**
- or for self-contained supply of the drives with an additional module



Pin assignment

A - B : Power supply polarity-independent
80 – 380V DC direct current or
80 - 265V AC alternating current

Attention: From a voltage of 120V and above, single-core double-insulated cables must be used!

1 - 2 : Connection for elevation motor
In case of wrong move direction – change connection 1-2

3 - 4 : Connection for east-west motor
In case of wrong move direction – change connection 3-4

Discription of further connecters

5 - 6 : Power supply to DEGERconecter elevation
5-plus-brown cable / 6-minus-white

7 - 8 : Power supply DEGERconecter east-west
7-plus-brown-cable / 8-minus-white-cable

9 - 10 : Input for self-contained supply of the tracking system with a module of 0.5-10Wp, 22-27V open circuit voltage

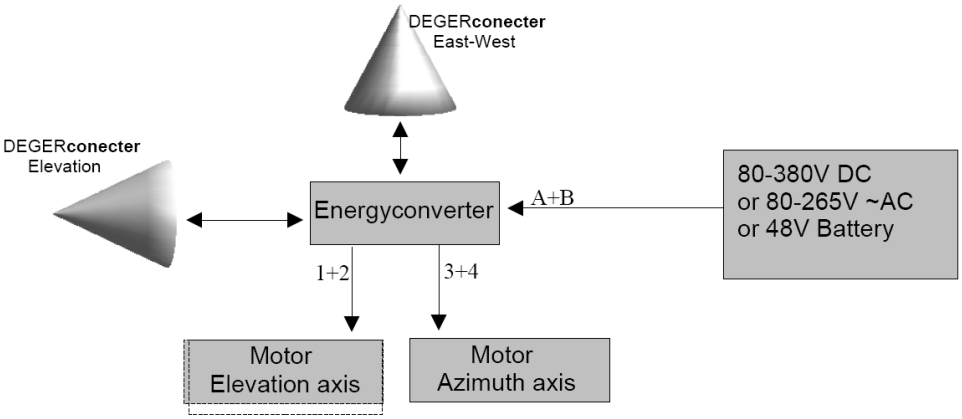
11-12: Output from DEGERconecter elevation
green cable-11 / yellow cable-12

13-14: Output fom DEGERconecter east-wset
geen cable-13 / yellow cable-14

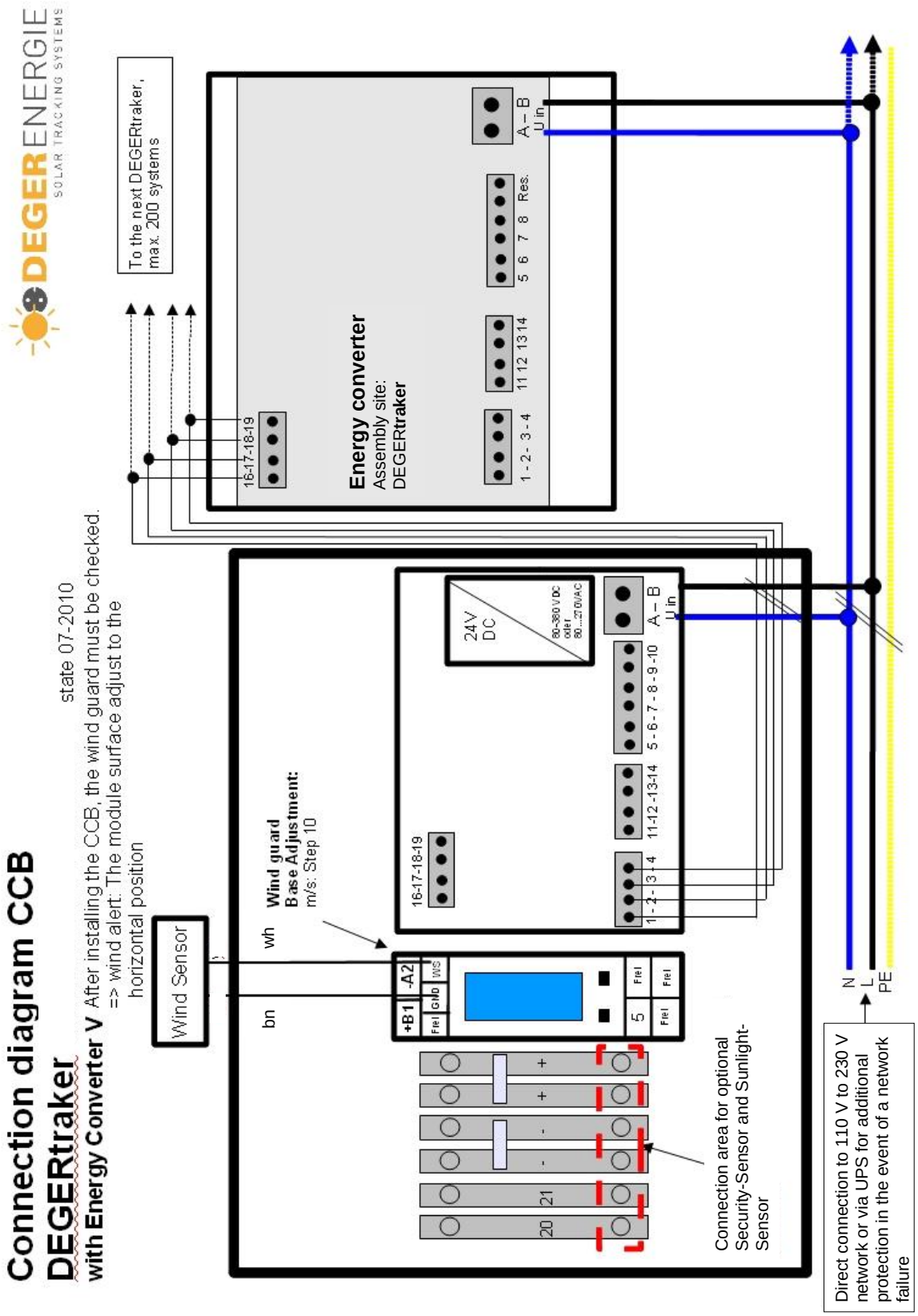
16-17: Input for selectiv switch circuit elevation axis (e.g. wind guard)

18-19: Input for selectiv switch circuit azimuth axis

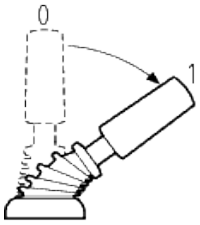
The complete control unit in overview:



Part V – Control unit
Connection diagram CCB with energy converter V



CCB and Windguard



It's possible to control up to 200 DEGER**trakers** manually using the optional CCB.. **Activating the joystick can override the automated operation. Every installation** connected to the CCB will move in the direction the joystick determines. If the joystick is brought back into the neutral position (0), all the DEGER**trakers** return to the automatic operation mode.

The wind monitoring function takes priority over manual control.
If the wind monitor relay has been triggered by 10m/s wind velocity, the DEGER**traker** moves into a horizontal position. Automatic or manual operation will only be possible again once the wind velocity has dropped below the value set for it. (After 10 minutes at the earliest)

Assembly Site for Windguard and CCB:

The windguard should be assembled at a point exposed to the wind, near the DEGERtraker above the upper edge of the module. An installation on the module surface is **not permitted**.

The Assembly location for the CCB can be freely selected – though **not directly next to the inverter**. It is recommended to install the CCB at a well accessible location within a building.

Setting the Windguard:

The windguard is set to a value of 10 m/sec at the factory. Under no circumstances may this value be increased. **Changing this value automatically entails a complete loss of warranty for the entire system.**

Feed Line to the Windguard:

Measurement lines are not to be laid in parallel to other electrical lines and are to be shielded as of a length of 32´ 9.71´´ (max. 98´ 5.14´´), for example JY-ST-Y. It is not permitted to connect the shield of the cable to GND. Use terminal screws and moistureproof boxes for extension.

Sunlight Sensor (optional):

The Sunlight Sensor continuously measures the insolation. At less than 100W/m², for example on cloudy weather or twilight, the tracker will move into flat position.

Installation of Sunlight Sensor:

Install the sunlight sensor with the spire on top at a light exposed position. Please note that the sensor must not be shaded at any point during the day.

Security Sensor (optional):

The Security Sensor detects snow and ice cover on the modules and is delivered preinstalled and calibrated. One the preset value is reached, DEGER**traker** moves to its max. vertical position to let snow and ice slide off.

Installation of Security Sensor:

The Security Sensor is installed on the underside of the module. A detailed assembly instruction is appended to the Security Sensor.

Declaration of Conformity

in accordance with EC machine directive 98/37/EG, addendum II A

for solar tracking systems

We,

DEGERenergie GmbH, 72160 Horb, Germany

herewith declare that the listed products in the way we put them in circulation destined for EC member countries are fitted with CE plates in accordance with EC machine directive.

Note:
This declaration will become invalid if the product is
- modified, supplemented or changed in any kind
- and/or accessories not from DEGERenergy are used
- and in case of inappropriate assembling or installation or not intended use/improper use without our express permission

marking of the systems:	DEGER**traker 5000HD, 6000NT**
EC-directives:	EC machine directive (98/37/EC) EC Low Voltage Directive 73/23/EEC) EC EMV directive (89/336/EWG) i.d.F. 93/31/EWG
Applied harmonised standards:	EN 60730-1:2000 EN 60730-1/A14:2005 EN 55011:1998 EN 61000-3-2:2000 EN 61000-3-3:1995 + A1:2001 EN 61000-6-2:2005 EN 50102
Applied national standards and technical specification:	VDE 0470-100,VDE 0875,E VDE 0530,DIN VDE 0470-1 DIN 42025 DIN 40050-2 DIN 1055-1 DIN 1055-4 DIN 18800 DIN 4149 (04/2005)

Horb, 01.08.2010

DEGERenergieGmbH , Artur Deger
- General Manager -

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

No. Z1A 0703 51965 001

Certificate owner	**DEGERenergie GmbH** **Tracking Systems** Steinhalde 56 72296 Schopfloch DEUTSCHLAND
Certificate owner	DEGERenergie GmbH Tracking Systems Steinhalde 56 72296 Schopfloch
Test mark	
Product	**Control systems** **Solar tracking system**

This product corresponds to the requirements of the German law for device and product safety. It can be labeled with the test mark shown above. A change of the design of the test mark is not allowed. The use of the GS label is allowed until the given time, the use of the TÜV label is unlimited as far as the certificate is not cancelled. Information is to be considered.

Test report No.	71314674, 70119249
GS label valid until	2012-03-07

Date, 2007-05-29
Page 1 from 2

Declaration of commitment DEGERtraker

DEGERtraker 5000HD, 6000NT

You have purchased a product that has undergone careful inspection prior to delivery. If the DEGERtraker that we have delivered should be found to contain defects we offer the following warranty to the following extent:

Warranty

DEGERenergie GmbH grants a two-year period for filing claims for defects. This period starts on receipt of delivery ex works. DEGERenergie GmbH offers free replacement of defective parts for justified claims during this period. Compensation for exchange work will be granted exclusively in accordance with the current time standards for substitute performance within the framework of the warranty against defects. If required, this list may be made available. In all other respects, in this regard also the General Terms for Deliveries and Services, as amended in September 2005, apply.
If DEGERenergie GmbH is in possession of a completely filled in commissioning protocol no later than four weeks after the system is commissioned or a maximum of three months after delivery, the deadline for filing claims for defects – as outlined under the following restrictions – will be extended by a period of three years for the 2-axis systems or *one year for the 1-axis systems*. During this period the warranty against defects only extends to parts containing material defects being replaced free of charge.
DEGERenergie offers an extended 20-year rust-through warranty for the complete steel structure, starting from delivery ex works.
The extended warranty applies exclusively to the replacement of defective materials but not to additional costs, in particular not to the work performed.
The party to the agreement must report any defect discovered to DEGERenergie GmbH without delay.

Evidence

DEGERenergie GmbH is liable to the party to the agreement for defects only if the part subject to complaint is returned free of charge to DEGERenergie GmbH along with a copy of the invoice that was issued to the party to the agreement. The nameplate on the equipment must be completely legible. A completely documented malfunction report (contained in the installation instructions) shall be submitted to DEGERenergie by email or fax.

Terms

The defective part must be returned to DEGERenergie GmbH in its original packaging or at least equivalent transport packaging free of charge. If the object of the agreement contains a defect for which DEGERenergie GmbH is responsible, DEGERenergie GmbH is obligated to remedy the defect or exchange the defective part for a new part, unless DEGERenergie GmbH is entitled to refuse subsequent performance on the basis of statutory provisions. An exchange of individual parts within the notification term for defects does not cause an extension to the term of the warranty.
DEGERenergie GmbH's party to the agreement shall grant DEGERenergie GmbH an appropriate deadline for subsequent performance.
The defect remedy or replacement of the defective part shall be free of charge to DEGERenergie GmbH's party to the agreement.
The DEGERtraker may be operated only in conjunction with a suitable wind protection system, which moves the solar module surface into the horizontal position during storms. The user must ensure that this wind protection system is always fully operational.

Exclusion of liability

Ground mount systems: Pursuant to the "Warranty" provision, DEGERenergie GmbH is in particular not liable for extra expenses (e.g. use of crane, boom lift, etc.) resulting from the use of higher masts than the standard version of 3.3 m total mast height.
DEGERenergie GmbH is not liable for damage that is attributable to improper operation by the party to the agreement, in particular using a module area that is too large in size.
The maximum installable module area depends on the location and must be determined taking regional circumstances and regulations into account with the aid of our dimensioning tool or via calculations performed by a local structural engineer. The dimensioning tool is available via cost free software download.
Damage that subsequently results from a defect in the tracking system is not subject to liability by DEGERenergie GmbH.

DEGERenergie GmbH is not liable for:

- Defects that are caused by non-designated use;
- Defects that result from the use of third-party components, such as e.g. installation profiles;
- Defects that result from changes to the mechanics and/or electronics;
- Defects that are caused by force majeure (lightning strike, power surge, storm, fire etc.);
- Defects that are caused by a module area that is too large pursuant to the DEGER layout tool (depending on installation location, mounting height, etc.);
- Defects caused by inappropriate interventions, modifications or attempts at repairs;
- Defects that are caused by installation and connection instructions that were not observed.

Supplementarily, our General Terms for Deliveries and Services also apply. As amended in: September 2005.

DEGERenergie GmbH
Industriestrasse 70
72160 Horb
www.degerenergie.com

(Artur Deger, CEO)

Acknowledged and accepted by the contracting party:

_____
(company name)

_____
(contracting party)

Report of implementing DEGERtraker

Type: ☐ DEGER**traker**5000HD ☐ DEGER**traker**6000NT

(Please fill in using capital letters so it is easily legible!!)

Operator:
Name: _____
Addres: _____
Telefon: _____

Installer/Planer:
Name: _____
Addres: _____
Telefon: _____

Delivery date: _____

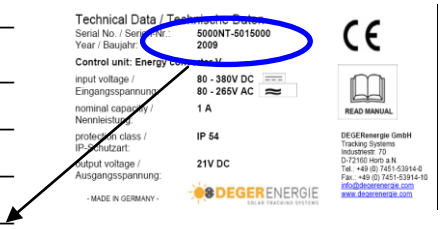
Delivery note number: _____
Please also attach a copy of the delivery note!!!

Date of implementing: _____

Name of the solar park: _____

Number of systems: _____

Serial number: (Tracker) _____
(please mention complete serial number)



Assembly:

☐ total height _____feet/inch
(top edge module surface)

☐ standard-mast ☐ Mast extension_____feet/inch

Control of the assembly		**Inplementing**
reinforcement of the foundation was build in due to the plan		
hole sphere of action is free of objects		
mechanic moves freely, cables are long enough		
cable connection of the EL-motor on the lower side		
locking fluid EL-motor is applied		
dimensions of module arrangement are abode		
Aluminum projection (dimensions) in relation to the supporting frame at the height of the EL motor, top		
Aluminum projection (dimensions) in relation to the supporting frame at the height of the EL motor, bottom		
lightning protection and grounding is connected		
conecter East-West axle is mounted laterally at the solar module surface		
conecter elevation axle is mounted laterally at the solar module surface		
Contol of the function		
East-West drive rotates towards the brightest spot		
Elevation drive rotates towards the brightest spot		
Test wind monitor setting (at 10 m/s)		
Measured data	**Measured data**	
current consumption motor elevation	0,4-1,1A	A
current consumption motor east-west	0,4-1,1A	A

Date: _____

Signature: _____ (Operator)

Signature: _____ (Installer/Planer)

IMPORTANT INSTRUCTIONS!
The commissioning protocol must be filled in when the system is first commissioned, and faxed within 4 weeks of commissioning (at the latest 3 months after delivery) to DEGERenergie GmbH +49 7451 5391410 or sent by e-mail to service@degerenergie.com.
The protocol is ready for download at www.degerenergie.com!
The validation of warranty claims for material faults will only be extended from the usual two years to five years on submission of the protocol within this time frame.

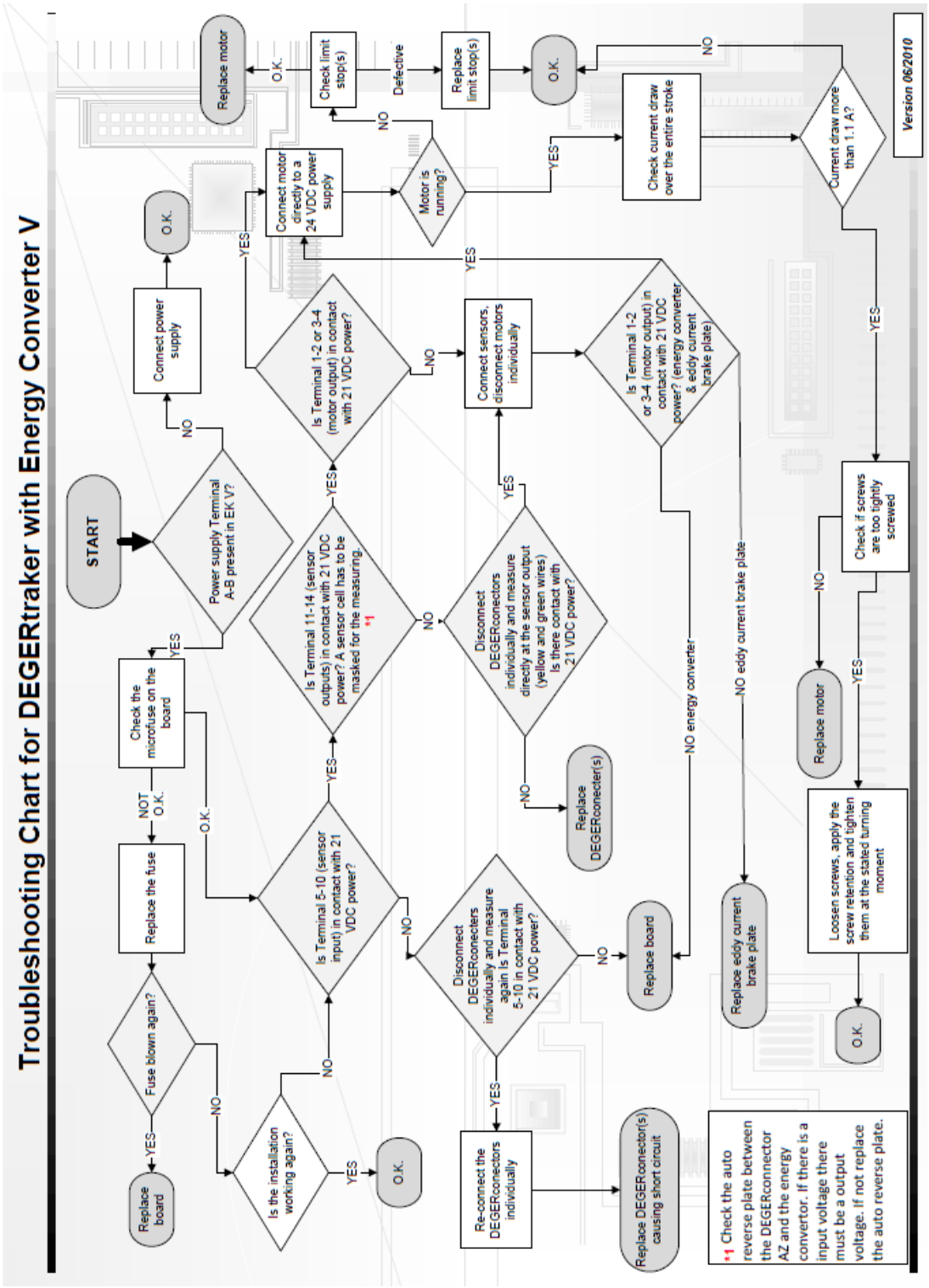
Assembly Instruction
DEGERtraker

Part VI - Certificates
List of DEGERtraker

No.	Position	Serial-No.	No.	Position	Serial-No.	No.	Position	Serial-No.

Part VII – Trouble shooting / Maintenance
Trouble Shooting

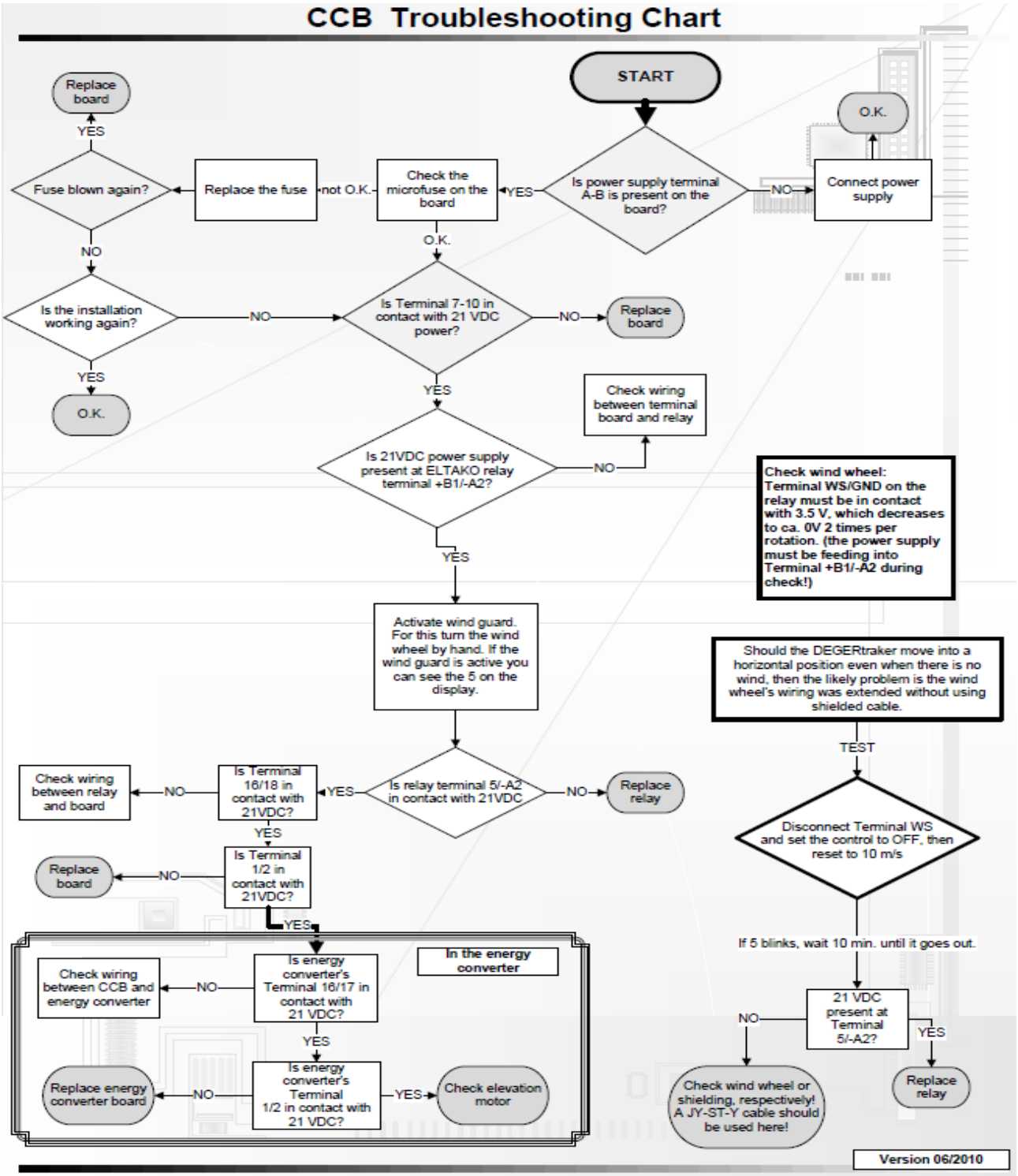
Precondition for trouble shooting:
The DEGERtraker has been assembled step by step as in the assembly instruction described


Troubleshooting Chart for DEGERtraker with Energy Converter V
START
Power supply Terminal A-B present in EK V?
Connect power supply
O.K.
Check the microfuse on the board
NOT O.K.
O.K.
Replace the fuse
Fuse blown again?
YES
Replace board
NO
Is the installation working again?
YES
O.K.
NO
Is Terminal 11-14 (sensor outputs) in contact with 21 VDC power? A sensor cell has to be masked for the measuring. *1
YES
Is Terminal 5-10 (sensor input) in contact with 21 VDC power?
YES
Is Terminal 1-2 or 3-4 (motor output) in contact with 21 VDC power?
YES
Connect motor directly to a 24 VDC power supply
O.K.
Replace motor
Check limit stop(s)
Defective
Replace limit stop(s)
O.K.
NO
Motor is running?
YES
Check current draw over the entire stroke
NO
Current draw more than 1.1 A?
YES
Check if screws are too tightly screwed
NO
Replace motor
YES
Loosen screws, apply the screw retention and tighten them at the stated turning moment
O.K.
NO
Connect sensors, disconnect motors individually
YES
Disconnect DEGERconnectors individually and measure directly at the sensor output (yellow and green wires) Is there contact with 21 VDC power?
NO
Replace DEGERconecter(s)
YES
Re-connect the DEGERconectors individually
Replace DEGERconector(s) causing short circuit
NO
Disconnect DEGERconecters individually and measure again Is Terminal 5-10 in contact with 21 VDC power?
NO
Replace board
YES
Is Terminal 1-2 or 3-4 (motor output) in contact with 21 VDC power? (energy converter & eddy current brake plate)
NO energy converter
NO eddy current brake plate
Replace eddy current brake plate
*1 Check the auto reverse plate between the DEGERconnector AZ and the energy convertor. If there is a input voltage there must be a output voltage. If not replace the auto reverse plate.
Version 06/2010

The application of the troubleshooting plan presented above enables a target-oriented troubleshooting.

To exchange defective parts, please contact us with the fault report located in these assembly istructions. We will promptly ship you the necessary replacement parts including detailed exchange instructions.

Part VII – Trouble shooting / Maintenance
Trouble Shooting CCB


CCB Troubleshooting Chart
START
Is power supply terminal A-B is present on the board?
YES
NO
O.K.
Connect power supply
Check the microfuse on the board
not O.K.
Replace the fuse
Fuse blown again?
YES
NO
Replace board
O.K.
Is the installation working again?
NO
YES
O.K.
Is Terminal 7-10 in contact with 21 VDC power?
NO
YES
Replace board
Check wiring between terminal board and relay
Is 21VDC power supply present at ELTAKO relay terminal +B1/-A2?
NO
YES
Check wind wheel: Terminal WS/GND on the relay must be in contact with 3.5 V, which decreases to ca. 0V 2 times per rotation. (the power supply must be feeding into Terminal +B1/-A2 during check!)
Activate wind guard. For this turn the wind wheel by hand. If the wind guard is active you can see the 5 on the display.
Should the DEGERtraker move into a horizontal position even when there is no wind, then the likely problem is the wind wheel's wiring was extended without using shielded cable.
TEST
Is relay terminal 5/-A2 in contact with 21VDC
NO
YES
Replace relay
Is Terminal 16/18 in contact with 21VDC?
NO
YES
Check wiring between relay and board
Is Terminal 1/2 in contact with 21VDC?
NO
YES
Replace board
Disconnect Terminal WS and set the control to OFF, then reset to 10 m/s
If 5 blinks, wait 10 min. until it goes out.
21 VDC present at Terminal 5/-A2?
NO
YES
Replace relay
Check wind wheel or shielding, respectively! A JY-ST-Y cable should be used here!
In the energy converter
Is energy converter's Terminal 16/17 in contact with 21 VDC?
NO
YES
Check wiring between CCB and energy converter
Is energy converter's Terminal 1/2 in contact with 21 VDC?
NO
YES
Replace energy converter board
Check elevation motor
Version 06/2010

The application of the troubleshooting plan presented above enables a target-oriented troubleshooting.

To exchange defective parts, please contact us with the fault report located in these assembly istructions. We will promptly ship you the necessary replacement parts including detailed exchange instructions.

Part VII – Trouble shooting / Maintenance
Maintenance

The DEGERtraker is designed for as less as possible service- and maintenance work to do. For a safe and long-life running of the system it is necessary to do the following jobs periodically once a year:

- control all screws and tighten them up to the torque given in the assembly instruction.

Mounting screw Dimensions	Tightening torque M_A[1)] in Nm screw strength class
M6	7.8
M8	19.1
M10	38.0
M12	66.5
M14	107.0
M16	168.0

1) M_A according to VDI-guideline 2230 (Feb. 2003) for μ_A=0.08 and μ_B=0.12

- Control all moving parts and lubricate them again if necessary. Pay special attention to the IMO.
- For this you can find some lubricate nipples at the IMO and at the bolt M24 (Fixation base frame).
- You find recommended lubricants in the list below.

Addapted Lubricants for DEGERtraker:

Supplier	Product name	Art.-Nr.	Applicable temperature range
Klüber	Klüberbio® M72-82	6800009	-40 ° F until +248 °F

Warning!!
The systems are filled up ex works with Klüberbio grease, which is not mixable with other greases.

That **Klüberbio Fett M72-82** can be obtained by DEGERenergie.

Protocols – Fault report DEGERtraker

To assist in case of problems with our systems it is necessary to have this fault report on hand.
Without a completely filled out fault report there can not be any support provided!!
Please send this report to the following fax number: +49 7451 5391410
or scan and email to: service@degerenergie.com
Please provide a phone number to contact you.
RECALL-NUMBER: _____ (required)

Fault report from ___.___._____

1 Information about the system

☐ 5000HD (since 5/2008)
☐ 6000NT (since 9/2010)

_____ date of delivery	☐ individual DEGERtraker ☐ plant with trackers	_____ serial number(s)	
energy-converter-type: ☐ I ☐ II ☐ III ☐ V	wind guard-type: ☐ ELTAKO ☐ ELERO ☐ CCB I ☐ CCB II	power-supply-energy-converter Voltage: V, ☐ AC, ☐ DC	
assembly: ☐ free standing ☐ integrated in building		total height (top edge of module-surface over ground) feet/inch	

2 Measurement

function-control:			o.k.?
East-West drive rotates to the brightest spot (cover one sensor cell)			☐
Elevation drive moves to the brightest spot (cover one sensor cell)			☐
by activating wind-guard the DEGERtraker moves into horizontal position			☐
Measured data at the energy-converter		**gain**	**measured**
power supply	clamp A-B		V
DEGERconecters:			
power supply to DEGERconecter elevation	clamp 5-6	20-24V	V
output from DEGERconecter elevation	clamp 11-12	20-24V	V
power supply to DEGERconecter east-west	clamp 7-8	20-24V	V
output from DEGERconecter east-west	clamp 13-14	20-24V	V
Motors:			
power supply to motor elevation	clamp 1-2	20-24V	V
power supply to motor east-west	clamp 3-4	20-24V	V
current consumption motor elevation		0,4-1,1A	A
current consumption motor east-west		0,4-1,1A	A

To give you a quick help this completely filled in form is required.

Without a completely filled in form the processing of complaints is not possible!

For guarantee claims a copy of the delivery note is required additional.

Send the completely filled in form to: service@degerenergie.com or by Fax: +49 7451 53914-10 to DEGERenergie.

We´ll get in contact to you.
Thank you for your cooperation.

3 Data

Contact
☐ distributor ☐ installer ☐ operator

_____ Company / location

_____ Adress

_____ ZIP Code / location

_____ Contact person

adress to send defective parts back:

DEGERenergie GmbH
- Service -
Industriestrasse 70
72160 Horb a.N.

4 Formulation of problem

5 Spare-part(s) with number